BIOLOGICAL ELEMENTS

MAJOR FOREST COMMUNITIES

The following tables show the cross-walk between forest communities and the associated 'continuous inventory of stand conditions' (CISC) forest cover types for the Chattahoochee and Oconee National Forests. They display the relative abundance of the forest communities on each forest and the forest type composition of each community. These forest community groupings were used for the SPECTRUM analysis for the major forest communities discussed below.

The forest community types are essentially a one-to-one correspondence with the old growth community types, as they were adapted from Regional Guidance to apply specifically to the Chattahoochee-Oconee National Forest. The splits on site index were used to separate acreages of those forest cover types that occur on both very dry and dry sites.

Table 3- 30. Current Composition of Forest Communities Analyzed In the SPECTRUM Model for the Chattahoochee National Forest Plan Revision

Community Type	% of Forested Acres	Forest Type (CISC Code)	Forest Type % of Community
Dry-Mesic Oak Forest	33	Post Oak-Bear Oak (51)	<1
		Chestnut Oak (52) SI>60[1]	<1
		White Oak-Red Oak-Hickory (53)	99
		White Oak (54)	1
		Northern Red Oak (55)	<1
		Scarlet Oak (59) SI>60	<1
		Chestnut Oak-Scarlet Oak (60) SI>60	<1
Dry and Dry-Mesic Oak-Pine Forest	28	White Pine-Upland Hardwood (10)	7
		Shortleaf Pine-Oak (12) SI>60	7
		Loblolly Pine-Hardwood (13)	1
		Virginia Pine-Oak (16) SI >60	8
		Loblolly Pine (31)	12
		Shortleaf Pine (32) SI>60	15
		Virginia Pine (33) SI>60	13
		Upland Hardwood –White Pine (42)	11
		Southern Red Oak-Yellow Pine (44)	2
		Chestnut Oak-Scarlet Oak-Yellow Pine (45)	16
		White Oak-Red Oak-Yellow Pine (47)	5
		Northern Red Oak-Yellow Pine (48)	2
Mixed Mesophytic and Western Mesophytic Forest	18	White Pine-Hemlock (04)	1
		Hemlock (05)	<1
		Hemlock-Hardwood (08)	1
		White Pine-Cove Hardwoods (09)	5
		Cove Hardwoods-White Pine-Hemlock (41)	14
		Yellow Poplar (50)	10
		Yellow Poplar-White Oak- N. Red Oak (56)	68
Conifer-Northern Hardwood Forest	9	White Pine (03)	100
Dry and Xeric Oak Forest, Woodland, and Savanna	6	Chestnut Oak (52) SI<60	51
		Scarlet Oak (59) SI<60	16
		Chestnut Oak-Scarlet Oak (60) SI<60	32
Xeric Pine and Pine-Oak Forest and Woodland	6	Shortleaf Pine-Oak (12) SI<60	20
		Pitch Pine-Oak (15)	17
		Virginia Pine-Oak (16) SI<60	3
		Table Mountain Pine-Hardwoods (20)	1
		Shortleaf Pine (32) SI<60	25
		Virginia Pine (33) SI<60	6
		Pitch Pine (38)	27
		Table Mountain Pine (39)	1
River Floodplain Hardwood Forest	<1	Bottomland Hardwood-Yellow Pine (46)	81
		Sweet Gum-Yellow Poplar (58)	18
		Black Ash-American Elm-Red Maple (71)	1
Eastern Riverfront Forest	<1	River Birch- Sycamore (72)	50
		Cottonwood (73)	43
		Black Walnut (82)	7

1: SI = Site Index

Table 3- 31. Current Composition of Forest Communities Analyzed In the SPECTRUM Model for the Oconee National Forest Plan Revision.

Community Type	% of Forested Acres	Forest Type (CISC Code)	Forest Type % of Community
Dry and Dry-Mesic Oak-Pine Forest	72	Shortleaf Pine-Oak (12) SI >60[1]	<1
		Loblolly Pine-Hardwood (13)	2
		Loblolly Pine (31)	93
		Shortleaf Pine (32) SI >60	3
		Virginia Pine (33) SI >60	<1
		Southern Red Oak-Yellow Pine (44)	<1
		White Oak-Red Oak-Yellow Pine (47)	1
		Northern Red Oak-Yellow Pine (48)	1
Dry-Mesic Oak Forest	13	White Oak-Red Oak-Hickory (53)	100
		White Oak (54)	<1
River Floodplain Hardwood Forest	9	Bottomland Hardwood-Yellow Pine (46)	6
		Sweet Gum-Yellow Poplar (58)	85
		Swamp Chestnut Oak-Cherrybark Oak (61)	2
		Sugarberry-American Elm-Green Ash (63)	6
		Overcup Oak-Water Hickory (65)	1
Mixed Mesophytic and Western Mesophytic Forest	3	Yellow Poplar-White Oak- N. Red Oak (56)	100
Seasonally Wet Oak-Hardwood Woodland	3	Sweet Gum-Nuttall-Oak-Willow (62)	99
		Laurel Oak-Willow Oak (65)	1
Eastern Riverfront Forest	<1	Sycamore-Pecan-American Elm (75)	100

1: SI = Site Index

Mesic Deciduous Forests

Affected Environment

The mesic deciduous forests covered in this section include northern hardwood, mixed mesophytic, river floodplain hardwood, and upland mesic hardwood community types (USDA Forest Service, 1997). It also includes the more mesic end of the dry-mesic oak forest community (CISC Forest types: (51) Post Oak-Black Oak, (53) White Oak-Red Oak-Hickory, (54) White Oak, (55) Northern Red Oak.) These forest types are characterized by relatively low levels of disturbance, and from a habitat perspective, their primary value is providing habitat for a variety of species dependent on mid- and late-successional forest stages.

Abundance

Oak forests are the dominant forest cover type in the Southern Appalachian Assessment Area, comprising over 1/3 of the land area (SAMAB 1996:23). However, this figure includes both mesic and xeric oak forests. Other mesic deciduous forest communities such as northern hardwood, mixed mesophytic hardwood, and bottomland hardwood forests are less common, comprising 1.6, 8.4 and 1.2 percent of the land area of the SAA area, respectively.

Mesic deciduous forests are abundant and well distributed on the Chattahoochee National Forest, comprising 45 percent of the Forest. Mesic deciduous forests are less common on the Oconee occupying 28 percent of the landscape and found primarily concentrated in the drains of the major river systems. The current acreage of mesic deciduous forests for the Chattahoochee and Oconee National Forests is shown in Table 3- 32.

Table 3- 32. Current Acreage (and Percent) of Mesic Deciduous Forest by Successional Class, for the Chattahoochee and Oconee National Forests, 2002.

	Chattahoochee	Oconee
Early Successional	10,335	408
Sapling/Pole	47,470	541
Mid- Successional	152,647	15,377
Late-Successional (including Old Growth)	240,093	11,852
Total	450,565	28,178
Total acres of mid- and late-successional mesic deciduous forests	392,740	27,228
% of total mesic deciduous forest acres in mid- and late-successional stages	87.2%	96.6%
% of total forested acres in mid- and late-successional mesic deciduous forests	53.0%%	24.7%

Age Class Distribution

For the Southern Appalachian Assessment Area, the majority of the mesic deciduous forests are currently in older age classes. Across all ownerships, approximately 75-80 percent of maple-beech-birch (northern hardwoods), oak-hickory, and elm-ash-cottonwood (bottomland hardwoods) forests are in mid- and late-successional stages (SAMAB 1996: 165). There are approximately 3.5 million acres of deciduous forest on National Forest lands within the SAA area (SAMAB 1996:168). Of these acres, 2 percent are in early-successional forest, 6 percent are in the sapling/pole forest, 45 percent are in the mid-successional forest, and 46 percent are in late-successional forest.

A key management issue for this community is maintenance of a high proportion of this type in mid-and late-successional conditions to provide habitat for associated species. There are a number of viability concern species that are broadly associated with mature mesic deciduous forests, and others that are more specifically associated with such forests at high elevations (Appendix F).

The current age class distribution of mesic deciduous forests for the Chattahoochee and Oconee National Forests is shown in Table 3- 32, above. Over 85 percent of these forest communities are in mid- and late-successional stages. These older deciduous forest make up over 53 percent of the total forest acres on the Chattahoochee, and, because of it's more limited distribution, approximately 24 percent of the Oconee. Approximately 1 percent on both the Chattahoochee and Oconee are in the 0-10 age class (early successional).

Forest Structure

A number of bird species, including the cerulean warbler (*Dendroica cerulea*) favor mature, mesic hardwood forests with a diverse and well-developed canopy structure including canopy gaps and associated midstory and understory structural diversity (Ramey, 1996; Buehler and Nicholson, 1998; Rodewald and Smith, 1998; Nutt, 1998). Species of potential viability concern associated with canopy gaps and structurally diverse understories in mesic deciduous forests are identified in Appendix F. This structural diversity may be characteristic of the decadent, patchy conditions found in old growth forests, to which these species have presumably adapted. While a growing portion of the landscape in the Southern Appalachians consists of large hardwoods, most sites have very simple canopy structures (Runkle, 1985). This lack of structure is likely the result of previous even-aged timber management, resulting in forest stands of approximately equally-aged trees with low mortality and few canopy gaps. Most of these mid- and late-successional forests have not yet begun to develop the canopy gaps characteristic of old growth forests. It may be many centuries before such structure develops through natural succession.

Intermediate treatments such as thinning can be used to improve forest structure in mesic deciduous forests. Canopy gaps created by these treatments would stimulate the development of the desired midstory and understory structure. Single-tree selection or small group selection (generally less than 0.75 acre group maximum size), implemented at relatively low intensities, achieves very similar desired conditions.

Management Indicators
Several management indicators have been identified for assessing effects to mesic deciduous communities. These include both Management Indicator Species (MIS) and key habitat variables.

The cerulean warbler is a high-priority Neotropical migrant that breeds in the eastern US and Canada (DeGraaf et al. 1991, Rosenberg et al. 2000). Breeding bird survey results indicate that it experienced an average annual decline of 4.2 percent per year from 1966-2000 (Sauer et al. 2000). In 1991 it was listed as a Category 2 (C2) candidate for listing under the Endangered Species Act and was petitioned for listing as threatened in 2000. It is currently undergoing status review by the US Fish and Wildlife Service. This species is associated with mature, mesic hardwood forests with a diverse and well–developed canopy structure (Ramey, 1996; Buehler and Nicholson, 1998; Rodewald and Smith, 1998; Nutt, 1998). The cerulean warbler is rare on the Chattahoochee National Forest, and is known from less than 20 sites on the forest. The great majority of these locations are from the Ivylog Mountain area on the Brasstown Ranger District.

The cerulean warbler is identified in the Forest Service National Strategic Plan as an emphasis species and will be monitored on the Chattahoochee National Forest, but not as a MIS. It is not an effective MIS because of its extreme rarity on the Forest and is not effectively monitored using standardized point count protocols. Consequently, trend analysis is not feasible. Its populations would primarily be evaluated based on presence or absence in targeted habitat types or in response to canopy gap treatments and other habitat enhancements to monitor if the species responds favorably.

The hooded warbler (*Wilsonia citrina*) is a Neotropical migrant that is fairly common to common throughout the southeastern United States during the breeding season (Hamel 1992). It is found in mixed hardwood forests of beech, maple, hickory and oaks with dense undergrowth (DeGraaf et al. 1991). It nests in saplings, shrubs or herbaceous vegetation. The hooded warbler is common both on the Chattahoochee and Oconee National Forests.

The hooded warbler (*Wilsonia citrina*) is selected as an MIS for mid- to late-successional mesic deciduous forests with canopy gaps and structurally diverse understories. It is more common and widely distributed than is the cerulean warbler. It is heavily associated with bottomlands and moist deciduous forests with fairly dense understories, where it breeds and feeds (Hamel 1992, Crawford et al. 1981). Management opportunities exist to increase the structural diversity of closed canopied habitats in this type to favor species, such as the hooded warbler, that optimize their life history in forests with canopy gaps and patches of dense understory. This species is [also] deemed appropriate for helping to indicate the availability of mid- and late-successional mesic deciduous habitats and the efficacy of management intended to favor its habitat.

Key habitat variables identified for this community are total acres of mid- and -late successional mesic deciduous forests, and total acres treated to create canopy gaps.

Direct and Indirect Effects

Abundance and Age Class Distribution

The amount of regeneration treatments will affect the future quantity and distribution of mid- and late-successional mesic deciduous forests. The future age class distribution of mesic deciduous forests would vary among alternatives due to the differences in management intensity and emphasis. Table 3- 33 shows the proportion of existing mid- and late-successional deciduous forest by successional stage option for the Chattahoochee and Oconee National Forests, respectively (see the section on Early Successional Forests for a more detailed description of successional stage options). Those acres allocated to successional stage Options 1 and 2 would emphasize mid- and late-successional forests as compared to Options 3 and 4, which would emphasize moderate and high quantities of early-successional forest. The expected percentage change in mid- and late-successional mesic deciduous forest for each alternative after 10 and 50 years of implementation based on IMI model outputs is shown in Table 3- 34.

Table 3- 33. Percentage of Current Mid- And Late-Successional Mesic Deciduous Forest in Each Successional Stage Option by Alternative for the Chattahoochee and Oconee NF

	Chattahoochee National Forest Successional Stage Option			
	1	2	3	4
Alternative A	29.8	40.3	29.0	0.9
Alternative B	31.7	22.0	43.5	2.8
Alternative D	34.0	21.7	20.9	23.4
Alternative E	44.0	49.6	3.7	2.7
Alternative F	29.2	12.6	.7	57.2
Alternative G	58.5	37.4	4.1	0
Alternative I	30.0	44.4	24.4	1.2
	Oconee National Forest Succession Stage Options			
	1	**2**	**3**	**4**
Alternative A	9.3	5.0	85.4	.4
Alternative B	8.2	8.9	82.9	0
Alternative D	14.2	.6	84.9	.4
Alternative E	9.9	15.4	69.9	4.8
Alternative F	3.1	.3	20.1	70.6
Alternative G	10.9	1.3	85.4	.4
Alternative I	15.5	8.6	75.9	0

IMI Effects Analysis Output August 2003

1 –Successional Stage Options:

1- No objective for creating early-successional forest: areas are expected to provide mid- and late-successional forest habitat.

2 – Areas with predominance of mid and late-successional forests, but up to 4% in early-successional forest.

3 – Areas with mid and late-successional forests common, but 4 to 10% in early-successional forest.

4 - Areas with emphasis on early-successional forests, with 10-17% in early-successional forest

For the Chattahoochee National Forest, the majority of the existing mid- and late-successional deciduous forest would be allocated to prescriptions that would maintain the predominance of older forests (successional stage option 1 or 2) in all alternatives except B and D. In contrast, on the Oconee, except for Alternative G, the majority of the existing mid and late successional deciduous forest would be allocated to prescriptions that would result in some emphasis on early- successional forests. However, even then, only moderate levels of early successional habitat would be created (10 percent or less) and mid- and late-successional mesic forests would still be relatively common.

Table 3- 34. Expected Percentage Change In Acreage Of Mid- and Late-Successional Mesic Deciduous Forest On The Chattahoochee-Oconee National Forests, After 10 And 50 Years Of Implementing Forest Plan Alternatives).

Alternative	Percentage Mesic Deciduous P1	Percentage Mesic Deciduous P5
Chattahoochee NF		
A	-1.97%	8.48%
B	-3.32%	4.40%
D	-4.84%	3.02%
E	-1.64%	11.29%
F	-5.11%	4.86%
G	-0.97%	12.64%
I	-2.10%	7.26%
Oconee NF		
A	-4.10%	-6.57%
B	-3.89%	-2.67%
D	-5.83%	-0.93%
E	-4.10%	-6.82%
F	-7.22%	-2.30%
G	-4.10%	-2.88%
I	-3.75%	-2.31%

Derived From SPECTRUM Models, Base Year 1998

<u>Forest Structure</u>

With the exception of mesic oak forests, the forest types included here are not benefited by presence of fire and many associated species are fire intolerant. Forestwide objectives and standards have been established to minimize the acreage of these forests prescribed burned and reduce the impacts of prescribed fire in these communities when included as part of landscape-level burn units.

The ability to manage existing mid- and late-successional mesic deciduous forests to create desired structural habitat conditions would vary among alternatives due to the differences in management intensity and emphasis. Expected activity levels related to the creation of canopy gaps for all alternatives are shown for the Chattahoochee and Oconee National Forests, respectively.

Table 3- 35. Expected Activity Levels Related To The Creation Of Canopy Gaps In Mesic Deciduous Forests For The Chattahoochee National Forest By Alternative.

Activity	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Acres of mid and late successional mesic hardwood forests to be treated to create canopy gaps during first decade of plan implementation	10,300	11,200	12,300	8,500		7,200	10,000
Percent of current total acres of this habitat type to be treated	3%	3%	3%	2%		2%	3%

Output derived from GIS Plan Revision CISC database

Table 3- 36. Expected Activity Levels Related To The Creation Of Canopy Gaps In Mesic Deciduous Forests For The Oconee National Forest By Alternative.

Activity	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Acres of mid and late successional mesic hardwood forests to be treated to create canopy gaps during first decade of plan implementation	1,070	1,020	1,060	1,010		900	1,000
Percent of current total acres of this habitat type to be treated	3%	3%	3%	3%		3%	3%

Output derived from GIS Plan Revision CISC database

Canopy gap treatments that enhance structural diversity in mature mesic hardwoods would benefit species such as cerulean warbler and hooded warbler as well as numerous other species associated with these habitat conditions. The cerulean warbler responds to changes in canopy structure resulting from canopy gaps. In the short-term, alternatives that provide for more creation of structural diversity in close-canopied mesic deciduous forests are expected to support larger populations of this species than alternatives that provide less of this condition; however, breeding densities are expected to remain low under all alternatives due to the position of the forest within its range (Hamel 1992:275). In the long term, alternatives that provide the highest levels of late-successional mesic deciduous forests are most likely to support the largest populations of this species. Additional standards also have been included under all alternatives to protect habitat known to currently be occupied by cerulean warblers. These include measures that both protect the structure of occupied habitat from modification and protect birds from disturbance during breeding. Inventory and monitoring of this species would be used to document occurrences and population response to effects of management on canopy structure in nearby habitat.

Hooded warblers are more common than cerulean warblers, and respond to the understory growth that ultimately results from canopy gaps. Its highest population densities are expected in these situations. Average breeding densities reported by Hamel (1990:C-8) are 16.0 pairs per 100 acres. Populations are expected to be highest under alternatives that provide for more creation of canopy gaps and older decadent forests.

The following tables show the expected trends for the hooded warbler based on the ability to create, maintain and enhance the Mesic Deciduous habitats for this species on the forests.

Table 3- 37. Comparison Of Alternatives Effects On Expected Trends Of The Hooded Warbler – Chattahoochee National Forest

Alternative/Units of Comparison MIS – Community Indicators	A	B	D	E Trends	F	G	I
Hooded Warbler (Mid to Late Successional Deciduous Forest)							
1st decade	+	+	+	+	+	+	+
5th decade	++	++	+	++	+	++	++

Table 3- 38. Comparison of Alternatives effects on Expected trends of the Hooded Warbler- Oconee National Forest

Alternative/Units of Comparison MIS – Community Indicators	A	B	D	E Trends	F	G	I
Hooded Warbler (Mid to Late Successional Deciduous Forest)							
1st decade	+	+	+	+	+	+	+
5th decade	++	++	++	++	++	++	++

Cumulative Effects

Mesic deciduous forests are common on the Chattahoochee-Oconee National Forest. The majority of the acreage is concentrated in the Blue Ridge portion of the forest, which is the Chattahoochee National Forest. Although adjacent land ownerships have some of these mesic deciduous acreage, the majority of the acreage is on the Chattahoochee National Forest. The distribution of age classes is concentrated heavily in the mid to late successional stages with 90 percent occurring in those age classes (Table 3- 33). Management opportunities would allow maintenance and restoration of mesic deciduous forests however age class distribution may change with these practices. Maintenance and restoration of mesic deciduous forest is necessary to provide for the species using those habitats. Management opportunities under all alternatives will ensure continued persistence of this community.

Eastern Hemlock and White Pine Forests

Affected Environment

Eastern hemlock and white pine forests are broadly defined to include those forested communities that are either dominated or co-dominated by eastern hemlock (*Tsuga canadensis*) or eastern white pine (*Pinus strobus*) in the canopy. These forest types are the predominant components of the Conifer-Northern Hardwood community type described in the regional old-growth guidance (USDA Forest Service 1997:35-38). For the purposes of this analysis, forests with a significant component of eastern hemlock are classified as hemlock forests, even where white pine may be dominant (CISC types 4, 5, 8). White pine forests include all other forests where white pine is dominant (CISC types 3, 9, 10). This division puts priority on the presence of hemlock as a key habitat component. Table 3- 39 shows the current acres of forest types that comprise these habitats on the Chattahoochee National Forest. These forest types are absent from the Oconee National Forest.

Table 3- 39. Current Acres Of Forest Types Comprising The Eastern Hemlock and White Pine habitat conditions on the Chattahoochee National Forest[1].

Forest Type (CISC Code)	Acres	Percent of Habitat Condition
Eastern Hemlock		
White Pine–Hemlock (04)	1,564	47
Hemlock (05)	263	8
Hemlock-Hardwood (08)	1,512	45
Total	3,339	100
White Pine		
White Pine (03)	69,780	75
White Pine-Cove Hardwood (09)	7,145	8
White Pine-Upland Hardwood (10)	7,813	17
Total	92,738	100

[1] *Source: Plan Revision CISC data, modified from C-O CISC data, Base year 2000.*

Eastern hemlock forests typically occur on acidic soils and often have a dense shrub layer composed of ericaceous species. These communities are typically low in herbaceous diversity, but may support rich bryophyte communities. White pine forests occupy similar sites but also may occur on dryer locations, particularly in areas where fire has been suppressed. White pine plantations also have been widely established in the Southern Appalachians over the last 40 years.

The combination of a largely evergreen canopy and a dense midstory in naturally occurring hemlock and white pine forests provide for a variety of benefits, including shading and cooling of riparian systems, thermal cover for wildlife, and nesting and foraging habitat for several species of neotropical migrant birds dependent upon the layered canopy structure and understory thickets (Rhea and Watson 1994). There is some evidence that hemlock-white pine forests provide necessary habitat components for the long-term conservation of red crossbills (Dickson 2001). Eastern hemlock forests may also be important refugia for species typically adapted to higher elevations. Dickson (2001) states that red-breasted nuthatches, winter wrens, and golden-crowned kinglets are found in late successional hemlock forests down to elevations of 2,000 feet, and several species of rare bryophytes that are known to occur primarily within the spruce/fir zone are also found at lower elevations in humid gorges often under a canopy that includes eastern hemlock (Hicks 1992). There are a number of species of plants and animals with viability concerns that are associated with mature hemlock forests (Appendix E, Table L1).

In 1996, the Southern Appalachian Assessment (SAMAB 1996e:165) estimated that there were 617,687 acres of "White Pine-Hemlock Forests" across all land ownerships in the southern Appalachians, representing 2.5 percent of the total land base. This figure represents data collected from FIA, CISC, and LANDSAT imagery. The current amount and distribution of mature eastern hemlock forests is threatened by the recent emergence of the hemlock wooly adelgid in the southern Appalachians. First identified in the eastern United States near Richmond, VA in 1924, this exotic pest has recently spread into the southern Appalachians and threatens to spread throughout the range causing mortality within five years after initial infestation (SAMAB 1996e:117-119).

Table 3- 40 displays the acres of eastern hemlock and white pine forests by successional stage for the Chattahoochee National Forest.

Table 3- 40. Acres Of Eastern Hemlock And White Pine Forests By Successional Stage And Percent Of Total Forested Acres On The Chattahoochee National Forest, 2000[1,2].

Successional Stage	Acres
Eastern Hemlock	
Early Successional	23
Sapling/Pole	30
Mid- Successional	1,607
Late-Successional (includes old growth)	1,679
Total	3,339
Percent of Forested Acres	<1%
White pine	
Early Successional	3,274
Sapling/Pole	23,247
Mid- Successional	44,234
Late-Successional (includes old growth)	21,984
Total	92,738
Percent of Forested Acres	12%

[1] *Source: Plan Revision CISC data, modified from C-O CISC data, Base year 2000.*
[2] *Forest communities defined by CISC forest type groupings in Table 3- 30*

On the Chattahoochee National Forest, eastern hemlock forests are found primarily in association with north facing coves and slopes and riparian systems. Approximately 98 percent of the existing hemlock stands are in mid- and late successional conditions. Years of fire suppression have allowed individual hemlocks and white pine to creep upslope onto more xeric slopes and ridges where they would not likely exist under a natural fire regime. Hemlock regeneration also is becoming well established under mesic hardwood communities especially on higher elevation north slopes (K. Wooster, pers. comm.). Because of fire exclusion, white pine regeneration is well established in many oak stands. Over time, competition from white pine regeneration will prevent the establishment of oak regeneration and white pine will become the replacement stand (K. Wooster, pers. comm.). There are currently 92,738 acres of white pine forest types on the Chattahoochee National Forest, approximately 23,000 acres of which originated as plantations.

Management Indicators

Two key habitat variables are selected as management indicators to monitor the condition of eastern hemlock and white pine forests. The number of acres of hemlock forests infested with hemlock wooly adelgid and the number of acres of white pine plantations restored to diverse native communities will be tracked annually. The selection and monitoring of management indicator species may be an appropriate tool when a clear correlation between a specific management activity and the population trend of the species is known. Because the main factor that may cause a decline in hemlock forests and associated species is the hemlock wooly adelgid rather than management, it is not meaningful to select management indicator species for this community type.

Direct and Indirect Effects

Abundance

The amount and distribution of white pine forests has increased over its natural abundance through the establishment of plantations and a process of upland encroachment that is a result of years of fire suppression. White pine plantations are often closed canopy stands with little botanical diversity. In many situations, white pine has displaced or is displacing other forest types that are more valuable to wildlife, especially oak forests, but also including yellow pine and mixed mesophytic forests. The Forest plan includes objectives to restore both oak and oak-pine forests and yellow pine forest on appropriate sites (see Oak and Oak/Pine and Pine and Pine/Oak Sections). Some of the areas that would be targeted for restoration are currently occupied by white pine plantations.

Table 3- 41 shows the proportion of white pine plantations (CISC Forest type 03) by vegetation management level by alternative. The greatest opportunity for active management of white pine plantations for restoring native diversity occurs under Alternatives F, B, and D. Good, but more moderate, opportunities are available under Alternatives A and I, with the lowest opportunities present under Alternatives E and G. Acres of white pine plantations would be expected to decrease in all alternatives.

Table 3- 41. Percent of Existing White Pine Plantations in Each Vegetation Management Level by Alternative for the Chattahoochee National Forest[1]

Alternative	Vegetation Management Level			
	None	Low	Medium	High
A	4.6	53.3	42.1	0
B	5.3	16.1	78.4	0.2
D	7.8	23.0	46.6	22.6
E	7.5	76.9	15.7	0
F	3.8	12.7	1.1	82.5
G	11.3	79.9	8.8	0
I	4.3	50.3	45.2	0.2

[1]*Source: IMI analysis of using GIS stands data as modified for plan revision, Alt A-G 12/02/02; Alt I 8/26/03, Base year 2000.*

With a renewed emphasis on introducing fire onto the landscape in areas where natural fire may have played a role in shaping historic vegetative patterns, it is likely that white pine distributions also will shrink from areas such as upland oak sites where it has become established in the absence of fire. In general, the use of prescribed fire will be consistent with the vegetation management level, though it is also possible to have low to moderate prescribed fire use in areas where vegetation management is low to none. The level of prescribed fire is expected to be highest in Alternatives F, D, and B and lowest in Alternatives E and G.

Eastern hemlock forests are naturally limited in distribution, occurring primarily in association with north facing coves and slopes and riparian systems. Under all alternatives, forestwide standards are included that defer existing hemlock forests from regeneration cutting during this plan period and that maintain the hemlock component where it occurs as patches within other forest types. These provisions are included under all alternatives in an effort to maintain mature hemlock forests in the face of threats to this type from the hemlock wooly adelgid. As a result of these provisions, no changes to the distribution and abundance of eastern hemlock forest are anticipated as a direct or indirect effect of national forest management. However, long-term effects from the hemlock wooly adelgid may be large (see cumulative effects and Forest Health Section).

<u>Condition</u>

Efforts to restore white pine plantations to more diverse natural communities would benefit species dependent on multi-layered canopies with an evergreen component. Because hemlock forests would not be subject to regeneration cutting this planning period, hemlock forests would move into older age classes with Plan implementation, increasing abundance of mature forests of this type under all alternatives. Activities within hemlock stands would be limited under all alternatives and would promote mature forests with the desired multi-layered canopy condition that is needed by many species of wildlife.

Because hemlock and white pine forests would be managed to optimize their natural distribution, abundance, and condition in all plan alternatives, potential effects through plan implementation to these vegetative communities should be positive. All alternatives are expected to provide desired habitat conditions for species associated with mature hemlock forests (Appendix E, Table L1). Because provisions for maintenance of hemlock are similar across all alternatives, the magnitude of these positive effects would be similar for all alternatives.

Cumulative Effects

A 39-percent increase in the acreage of white pine-hemlock forests has been documented across both public and private ownerships in the southern Appalachians since the mid 1970's (SAMAB 1996e:27). This is largely attributable to an increase in managed stands of white pine (plantations) and upland encroachment of both white pine and hemlock into areas where it would not occur under a natural fire regime. The use of prescribed fire in the restoration of upland habitats will likely shrink these communities back to a more natural distribution on the landscape over time. Despite Plan protection and restoration objectives, the current amount and distribution of mature eastern hemlock forests is threatened by the recent emergence of the hemlock wooly adelgid in the southern Appalachians. The fact that this community type is naturally limited in distribution, coupled with the impending threats from the hemlock wooly adelgid, which will impact the species regardless of land ownership, leaves the long-term maintenance of historical distribution and abundance of this community type in question. The fate of associated viability concern species will be dependent on their ability to adapt to changing environmental conditions associated with the decline of hemlock from these communities. Species that use other forest communities in addition to hemlock forests would be more likely to persist than species that are obligates to the hemlock forest community (Ross et al. 2002).

Oak and Oak-Pine Forests

Affected Environment

Oak dominated forests covered under this section are most closely approximated by the dry-mesic oak, dry and dry-mesic oak pine, and dry and xeric oak old-growth forest community types (USDA Forest Service 1997). These oak forests vary greatly in their species composition due to its wide distribution. The major species include chestnut oak (*Quercus montana*), northern red oak (*Q. rubra*), black oak (*Q. velutina*), white oak (*Q. alba*), and scarlet oak (*Q. coccinea*). The dry to mesic oak-pine forests considered here are oak-dominated forests containing a significant pine component. Predominant pine species include white pine (*Pinus strobus*), shortleaf pine (*P. echinata*), Virginia pine (*P. virginiana*), and loblolly pine (*P. taeda*). Table 3- 42 and Table 3- 43 show the current acres of forest types that comprise this habitat on the Chattahoochee and Oconee National Forests, respectively.

Table 3- 42. Current Acres Of Forest Types Comprising The Oak And Oak-Pine Forest Habitat Condition On The Chattahoochee National Forest [1].

Forest Type (CISC Code)	Acres	Percent of Habitat Condition
Southern Red Oak-Yellow Pine (44)	3,414	1
Chestnut Oak-Scarlet Oak-Yellow Pine (45)	34,707	10
White Oak-Black Oak-Yellow Pine (47)	10,805	3
Northern Red Oak-Hickory-Yellow Pine (48)	4,213	1
Post Oak- Black Oak (51)	520	<1
Chestnut Oak (52)	22,141	6
White Oak- Northern Red Oak –Hickory (53)	234,217	71
White Oak (54)	1,738	1
Northern Red Oak (55)	55	<1
Scarlet Oak (59)	7,182	2
Chestnut Oak –Scarlet Oak (60)	14,103	4
Total	342,095	100

[1] *Source: Plan Revision CISC data, modified from C-O CISC data, Base year 2000.*

Table 3- 43. Current Acres Of Forest Types Comprising The Oak And Oak-Pine Forest Habitat Condition On The Oconee National Forest [1].

Forest Type (CISC Code)	Acres	Percent of Habitat Condition
Southern Red Oak-Yellow Pine (44)	185	1
White Oak-Black Oak-Yellow Pine (47)	1,030	6
Northern Red Oak-Hickory-Yellow Pine (48)	468	3
White Oak- Northern Red Oak –Hickory (53)	14,739	90
White Oak (54)	26	<1
Total	16,448	100

[1] *Source: Plan Revision CISC data, modified from C-O CISC data, Base year 2000.*

Abundance

In the Southern United States, acres of oak-hickory and oak-pine forests have increased over the last 50 years. (USDA Forest Service 2001: 49). Oak and oak-pine forests are common throughout the South, comprising over half of the timberland of the region as a whole (USDA Forest Service 2001: 91-92). Oak-hickory forests are the dominant forest type in the Southern Appalachian Ecoregion, and are codominant with loblolly-shortleaf pine forests in the Piedmont Ecoregion. Southern yellow pine forest types dominate the Coastal Plain Ecoregion, but oak and oak-pine forests still comprise nearly 30 percent of the timberland in this Ecoregion.

The current acreage of oak forests for the Chattahoochee and Oconee National Forests is shown in Table 3- 44. Oak forests are abundant and well distributed on the Chattahoochee National Forest, comprising 46 percent of the forested acres. Oak forests are less common on the Oconee and are primarily concentrated in the drains of the major river systems. Oak forests comprise approximately 14 percent of the forested acres on the Oconee.

Table 3- 44. Acreage (and percent) of Oak Forest by Successional Class for the Chattahoochee and Oconee National Forests, 2000[1,2]

Oak Forest Succession Type	Chattahoochee	Oconee
Early Successional	2,306	315
Sapling/Pole	20,354	635
Mid- Successional	71,974	12,502
Late-Successional (including Old Growth)	247,461	2,996
Total	342,095	16,448
Total acres of Mid- to Late-Successional Oak Forest	319,435	15,490
% Of Total Oak Acres In Mid- And Late-Successional Oak Forests	93.4%	94.2%
% Of Total Forested Acres In Mid- And Late-Successional Oak Forests	42.6%	13.9%

[1] *Source: Plan Revision CISC data, modified from C-O CISC data, Base Year 2000.*
[2] *Forest communities defined by CISC forest type groupings in Table 3- 30 and Table 3- 31*

The abundance of these forests in the future will be primarily dependent on the management of existing oak stands to maintain oak dominance. However there also are opportunities to increase the availability of these forests by restoring oak forests to appropriate sites now occupied by pine plantations.

<u>Age Class Distribution</u>

Across the Southern United States, about 50 percent of the upland hardwood forests (predominantly oak-hickory) and 30 percent of the natural oak-pine forests are in mid- and late-successional stages (41+ year-of-age) (USDA Forest Service 2001: 69-70). However, only about 1 percent of the planted oak-pine forests are in mid- and late-successional stages. For the Southern Appalachian Assessment Area, approximately 75 percent of oak-hickory forests are in mid and late successional stages (SAMAB 1996e: 165).

The current age class distribution of oak forests for the Chattahoochee and Oconee National Forests is shown in Table 3- 44. For both forests, over 90 percent of the existing oak forests are in mid and late successional stages. Less than 1 percent of the oak forests on the Chattahoochee National Forest are in early-successional stages, while approximately 2 percent of the oak forests on the Oconee are in early-successional conditions.

Forest Structure

The structural condition of these oak forests is a key factor in the maintenance of these communities. Brose et al. (2001) reviewed the recent literature and describe an emerging hypothesis that periodic, low-intensity surface fires were crucial to the perpetuation of mixed oak forests for millennia. Fire appears to have played a critical role in the development of oak forests (Abrams 1992, Buckner and Turrill 1999). Current regeneration problems in many eastern oak forests are well documented (Loftis and McGee 1993) and research has shown that oak forests may not perpetuate themselves without some level of disturbance, especially on mesic sites (Loftis 1990). Treatments such as shelterwood harvest combined with prescribed burning (Brose at al. 1999) or basal area reduction from below using herbicides (Loftis 1990) have been shown to create conditions that promote adequate oak regeneration. Oak dominance can be maintained by maintaining suitable tree densities and moderate fire return intervals.

Oaks recruited consistently from the early 1600s to the early 1900s in the eastern forest biome. However, today with fire exclusion, red maple dominates the understory and will be the recruitment stand for the future (Abrams 2000). Most of the west and south slopes on the Chattahoochee National Forest are dominated by white pine and red maple regeneration (K. Wooster pers. comm.).

The reintroduction of managed fire in these ecosystems should be beneficial to oaks. Relative to other hardwoods, fire should favor oak because of their thick bark, sprouting ability, resistance to rotting after scarring and the suitability of fire-created seedbeds for acorn germination (Abrams 1996). Periodic burning may therefore play a major role in promoting advanced oak regeneration. Fires every few years may be the key to enabling oaks to become dominant over their associates in the advanced regeneration pool. (Van Lear and Waldrop 1989).

Treatments such as moderate thinning and prescribed burning also can be used to create the desired habitat conditions in closed canopy oak forests. There are a number of viability concern species that are associated with open canopy condition and moderate levels of prescribed burning in mature oak forests (Appendix E, Tables L1 and L2).

Mast Production

Mid- and late-successional oak forests provide an important source of hard mast and dens. Acorns are a critical fall and winter food for numerous wildlife species (Martin at al. 1951). The availability of acorns have been shown to strongly influence population dynamics of species such as black bear (Pelton 1989), squirrels (Nixon et al. 1975), white-tailed deer (Wentworth et al. 1992) and white-footed mice (Wolff

1996). The large diameter hollow trees and snags found in these older oak forests also are an important source of dens for black bears (Carlock et al. 1983). Hard mast production is an important habitat feature for a several wildlife species in demand for sport hunting. These include white-tailed deer, wild turkey, squirrels, and bear. There are no hard mast dependent viability concern species identified for either the Chattahoochee or Oconee National Forests (Appendix E, Table L1 and L2).

Management Indicators

Several management indicators have been identified for assessing effects to oak and oak-pine forest communities. These indicators include both Management Indicator Species (MIS) and key habitat variables.

Because of their wide distribution across moisture gradients, mid- and late-successional oak and oak-pine forests support a wide variety of species. Hooded warblers, selected as MIS for mid- and late-successional mesic deciduous forests adequately represent the mesic oak forest communities. This species is expected to respond positively to management actions (including thinning and moderate frequency burning) that are designed to stimulate advanced oak regeneration and perpetuation of the forest type on these mesic sites. Drier oak forests support a slightly different mix of species due to their more open condition. To represent this upland oak community, the scarlet tanager is selected as an MIS. This species is most abundant in upland mature deciduous forest (Hamel 1992). The scarlet tanager is common on the Chattahoochee National Forest. It also occurs on the Oconee National Forest, although it is much less common.

Four key variables for tracking management effects on this community type are selected. To indicate the level of management activity directed at maintaining this forest type, acres of the type burned annually and acres thinned annually are projected. Restoration efforts are tracked by the annual acreage of oak and oak-pine forest restored to appropriate sites currently occupied by other forest types. Because older oak forests are an important source of oak mast and dens, total acres of mid- and late-successional oak and oak-pine forests are also projected.

Direct and Indirect Effects

Abundance

The future abundance of oak and oak-pine forests is primarily related to the maintenance of stand conditions that ensure oak dominance, and to the restoration of oaks or oak-pine forests on appropriate sites currently occupied by pine plantations or other hardwood species such as gum and maple. Expected activity levels related to the maintenance and restoration of oak forests for all alternatives are shown in Table 3- 45 and Table 3- 46 for the Chattahoochee and Oconee National Forests, respectively. There are no specific objectives related to maintenance and restoration of oak forests in the current forest plan (Alternative F) although these types of activities are permitted over much of these forests. For the Chattahoochee, levels of maintenance activities such as prescribed burning and thinning, and restoration activities would be highest in Alternatives D, B, and I and lowest in Alternatives G and E. Expected activity levels are much lower and the differences among alternatives are much less pronounced for the Oconee National

Forest (Table 3- 46). Levels of maintenance and restoration activities would be highest in Alternatives I, A, and D and lowest in Alternatives G and E.

Table 3- 45. Expected Activity Levels Related to the Maintenance and Restoration of Oak Forests for the Chattahoochee National Forest by Alternative

Activity	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Acres of oak or oak-pine forests to be restored in first decade	1030	1120	1230	340	_	170	1250
Average annual acres of oak and oak-pine forests to be burned	7210	7840	8610	5950	_	5040	7600
Average annual acres of oak and oak-pine forests to be thinned	515	560	615	425	_	360	550

Table 3- 46. Expected Activity Levels Related to the Maintenance and Restoration of Oak Forests for the Oconee National Forest by Alternative.

Activity	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Acres of oak or oak-pine forests to be restored in first decade	535	510	530	505	_	450	550
Average annual acres of oak and oak-pine forests to be burned	535	510	530	505	_	450	550
Average annual acres of oak and oak-pine forests to be thinned	535	510	530	505	_	450	550

The ability to meet these activity levels, to manage these forests to ensure adequate oak regeneration, and to provide habitat conditions for species associated with open canopy condition and moderate levels of prescribed burning will vary among alternatives due to the differences in management intensity and emphasis. To compare the potential level of maintenance and restoration activities among alternatives, the current distribution of oak forest was compared with the prescription allocations by alternative. Prescriptions were rated as to the management opportunity (none, low, medium, and high) they provide for the levels of thinning and burning desirable for oak management. The percentage of the existing oak forests in each management opportunity level is shown in Table 3- 47 and Table 3- 48 for the Chattahoochee and Oconee National Forests, respectively.

Table 3- 47. Percentage of Oak and Oak-Pine Forest in Management Opportunity Level by Alternative for Chattahoochee NF[1,2]

Alternative	Management Opportunity Level [3]			
	None	Low	Moderate	High
Alternative A	25.4	18.6	24.8	31.2
Alternative B	26.9	6.1	19.4	47.7
Alternative D	27.9	14.6	17.5	40.0
Alternative E	29.2	13.3	50.2	7.3
Alternative F	22.7	5.0	11.4	61.0
Alternative G	36.7	29.6	28.5	5.1
Alternative I	23.5	12.3	37.6	26.6

[1]Forest communities defined by CISC forest type grouping in Table 3- 30
[2]Source: IMI analysis of using GIS stands data as modified for plan revision, Alt A-G 12/02/02; Alt I 8/26/03, Base year 2000.
[3] Management Opportunity Level: None: None-None
(Veg Mtg -Rx Fire) Low: None-Low, None-Medium, Low-Low
Mod: Low-Medium, Medium-Medium,
High: Medium-High, High-High

Table 3- 48. Percentage of Mid-and Late-Successional Oak Forest in each Management Opportunity Level by Alternative for Oconee NF[1,2]

Alternative	Management Opportunity Level [3]			
	None	Low	Moderate	High
Alternative A	2.0	7.4	8.2	82.5
Alternative B	2.0	9.5	9.6	79.0
Alternative D	2.0	10.9	4.6	82.5
Alternative E	3.4	9.1	11.9	75.8
Alternative F	2.2	1.2	4.8	91.7
Alternative G	4.0	10.7	10.5	74.8
Alternative I	2.2	8.0	15.2	74.6

[1]Forest communities defined by CISC forest type grouping in Table 3- 31
[2]Source: IMI analysis of using GIS stands data as modified for plan revision, Alt A-G 12/03/02; Alt I 8/23/03, Base year 2000.
[3] Management Opportunity Level: None: None-None
(Veg Mtg -Rx Fire) Low: None-Low, None-Medium, Low-Low
Mod: Low-Medium, Medium-Medium,
High: Medium-High, High-High

For the Chattahoochee National Forest, all alternatives except Alternative G would provide ample opportunities to manage existing oak forests to ensure adequate oak regeneration and create desired stand conditions. For these alternatives, in 50 years oak forests would continue to be abundant and well distributed across the Chattahoochee National Forest. Opportunities would be greatest in Alternatives F, B and I (Table 3- 45). For the Oconee National Forest, all alternatives would allow sufficient management opportunities for existing oak forests. Oak forests would still be less abundant than on the Chattahoochee National Forest, but availability would be increased due to restoration efforts. The greatest number of oak and oak-pine forests would be restored in Alternatives I, A, and D (Table 3- 46).

Age Class Distribution

The future age class distribution of oak forests will vary among alternatives due to the differences in management intensity and emphasis. Table 3- 49 shows the expected percentage change in mid- and late-successional oak forest for each alternative after 10 and 50 years of implementation based on SPECTRUM models. On the Chattahoochee National Forest the quantity of mid and late-successional oak forests decline slightly in year 10 of plan implementation for all alternatives. At year 50, the quantity of these habitats is expected to increase from current availability under Alternatives E, G, I, and A and decline slightly in all other alternatives except Alternative F, which show a moderate decline. Although the quantity of mid-and late-successional oak forests provided will vary among alternatives, these habitats are expected to be abundant and well distributed in all. All alternatives will maintain over 80 percent of the oak forests in mid- and late-successional conditions.

On the Oconee National Forest, all alternatives show a decline in the availability of mid- and late-successional oak forests at year 10. This decline is slight for all alternatives except Alternatives F and D, which show moderate declines. At year 50, all alternatives except Alternative F show an increase in the availability of these habitats over current conditions.

Table 3- 49. Expected Change In Acreage Of Mid- And Late-Successional Oak[1] Forest On The Chattahoochee-Oconee National Forest, After 10 And 50 Years Of Implementing Forest Plan Alternatives[2].

	Chattahoochee		Oconee	
Alternative	**10 Years**	**50 Years**	**10 Years**	**50 Years**
Alternative A	-2.7%	+0.8%	-4.9%	+12.5%
Alternative B	-3.5%	-3.4%	-2.2%	+16.0%
Alternative D	-5.0%	-6.0%	-19.1%	+19.5%
Alternative E	-1.5%	+10.5%	-2.6%	+17.0%
Alternative F	-4.6%	-17.2%	-27.6%	-20.3%
Alternative G	-0.5%	+9.7%	-2.3%	+27.7%
Alternative I	-3.3%	+1.8%	-2.1%	+13.1%

[1]Includes the dry-mesic oak, dry and dry-mesic oak pine, and dry and xeric oak forest community types as defined in Table 3- 30 and Table 3- 31 [2]Source : SPECTRUM model outputs, September 2003

The scarlet tanager has been selected as the MIS for mature upland oak forests. The expected population trends for the scarlet tanager for each alternative is shown in Table 3- 50 and Table 3- 51, for the Chattahoochee and Oconee National Forests, respectively. For the Chattahoochee National Forest, at year 10, scarlet tanager populations are expected to remain at current levels under all alternatives except Alternatives D and F, where slight declines are expected. At year 50 expected population levels are expected to increase for all alternatives except D and F. The greatest increases would be in Alternatives E and G. On the Oconee National Forest, scarlet tanager populations are expected to remain at current levels in year 10 for all alternatives except for Alternatives F, D, and A. However, by year 50, scarlet tanager populations are expected to increase for all alternatives except Alternative F. Population trend estimates are based on expected trends in habitat quantity and quality.

Table 3- 50. Expected Population Trend[1] Of The Scarlet Tanager On The Chattahoochee NF by Alternative 10 And 50 Years Following Plan Adoption.

Time Period	Alternative A	B	D	E	F	G	I
10 years	=	=	-	=	-	=	=
50 years	+	=	-	++	– –	++	+

[1] *Population trend expressed as expected change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "- -" = relatively large decrease.*

Table 3- 51. Expected Population Trend[1] Of The Scarlet Tanager On The Oconee NF by Alternative 10 And 50 Years Following Plan Adoption

Time Period	Alternative A	B	D	E	F	G	I
10 years	-	=	--	=	--	=	=
50 years	++	++	++	++	-	++	++

[1] *Population trend expressed as expected change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "–" = decrease, "––" = relatively large decrease.*

Forest Structure

As discussed above, the ability to manage these oak forests to ensure adequate oak regeneration and to provide habitat conditions for species associated with open canopy structure will vary among alternatives due to the differences in management intensity and emphasis (Table 3- 45 and Table 3- 46). For the Chattahoochee National Forest, all alternatives except Alternative G would provide adequate opportunities to manage existing oak forests to create desired habitat conditions for species associated with mature oak forests (Appendix E, Table L1 and L2). For the Oconee National Forest, all alternatives would allow sufficient management opportunities for existing oak forests.

Mast Production

Acorn production is greatest in mid and late successional oak forests. As discussed above, the expected quantity of mid- and late successional oak forests will vary among alternatives (Table 3- 49) as will the availability of oak mast. For the Chattahoochee National Forest, the quantity of mid- and late-successional oak forests and, consequently, acorn availability is expected to increase under all alternatives, except Alternatives B, D, and F through year 50. For the Oconee, acorn availability is expected to increase through year 50 for all alternatives except Alternative F. However, while the quantity of these habitats provided will vary among alternatives, because of the abundance of mature oak forests, hard mast is expected to be abundant and well distributed in all alternatives.

Cumulative Effects

Oak and oak-pine forests are common on the Chattahoochee and Oconee National Forests as well as on adjacent forest industry, non-industrial private, and other public lands (Thompson 1998a,b). Management opportunities permitted in most alternatives would ensure continued oak dominance on national forest lands. However, the majority of these oak forests are on non-industrial private lands. These lands are the least likely to receive active forest management and therefore the loss of oak dominance is likely to be more problematic in these areas.

Insects and diseases such as gypsy moth and oak decline also are expected to have an overall negative effect on oak forests in the future (SAMAB 1996e: 103-108, 114-117). Gypsy moth is expected to reach northeast Georgia by 2020 and many of the older forests already are experiencing oak decline. The greatest impact of oak decline will be immediately behind the advancing front of gypsy moth due to repeated severe defoliations. As existing oak stands grow older, susceptibility to this disease also will increase. Although oaks will not be eliminated from effected areas, oak abundance and diversity will be reduced. On both national forest and private lands, the future of oak forests will largely depend on active management such as thinning and burning that encourage oak reproduction to offset the impacts of these insects and diseases. Further discussion of these threats is found under the Forest Health section.

Pine and Pine-Oak Forests

Affected Environment

Pine-dominated forests covered in this section include all "Southern Yellow Pine" (SAMAB 1996: 163) forest types with various admixtures of hardwood species occurring as minor components. These forests occur on a variety of landforms at a wide range of elevations. The Southern Yellow Pine Association occurs throughout the Southern Appalachian, but is more common in the Piedmont and mountain-Piedmont transition zone. The species composition varies but is typically represented by loblolly and shortleaf pine. Past land use was dominated by agricultural activities, which is an important factor in determining the species composition including Virginia, shortleaf and loblolly pine. Loblolly pine was extensively planted in the Southern Appalachians. Table mountain pine and pitch pine are also representatives of Southern Yellow pine communities, these species are usually closely linked with occurrences of fire. This community occurs at low to intermediate elevations representatives (Silvics of North America Vol 1 1990). However, due to a combination of previous land use, fire exclusion, and intensive forestry (plantations), many pine species have expanded beyond their natural range and today, pine-dominated communities can be found on virtually all landforms and aspects.

Abundance

During the last 50 years across the southeastern United States, pine plantations have increased in importance, expanding from 1 percent of the total pine forest acres to 48 percent of those acres (USDA Forest Service 2001: 1). At the same time, the 20-year trend reported for the Southern Appalachian Assessment area (SAMAB 1996: 27) shows a downward trend of 16 percent for southern yellow pine forests. These two facts together suggest that natural yellow pine forests have declined significantly and represent an opportunity for large-scale restoration of this community type.

The current acreage of southern yellow pine types on the Chattahoochee-Oconee National Forests is displayed in Table 3- 52 and Table 3- 53

Table 3- 52. Current acreage of Southern Yellow Pine forest types for the Chattahoochee National Forest

Community Type	Acres
Loblolly Pine	24,168.22
Shortleaf Pine	41,934.05
Virginia Pine	30,195.66
Pitch Pine	11,435.51
Table Mountain Pine	304.47
Shortleaf Pine–Oak	23,965.10
Loblolly Pine–Hardwood	2,844.60
Pitch Pine–Oak	6,988.65
Virginia Pine–Oak	19,199.75
Table Mountain Pine–Hardwood	305.26
Total Acres of Southern Yellow Pine Forests	161,381.27

National Forest data is derived from the CISC Database.

Table 3- 53. Current Acreage of Southern Yellow Pine forest types for the Oconee National Forest

Community Type	Acres
Slash Pine (Experimental Planting)	28.91
Loblolly Pine*	74,479.72
Shortleaf Pine	2,172.23
Virginia Pine	4.73
Shortleaf Pine–Oak	126.41
Loblolly Pine–Hardwood	1,351.45
Total Acres of Southern Yellow Pine Forests	78,163.44

National Forest data is derived from the CISC Database.

The Chattahoochee-Oconee National Forests have been experiencing heavy southern pine beetle infestations since the mid 1980s on the Oconee, and the 1990s on the Chattahoochee. Currently many acres of southern yellow pine forests have been severely impacted. With large-scale mortality in these communities due to pine beetle effects, the opportunity now exists to restore these sites to a more natural mixed pine hardwood community.

Age Class Distribution and Forest Structure

On the Chattahoochee-Oconee, southern yellow pine forests are currently well distributed across the landscape.

The Southern Appalachian Assessment (SAMAB 1996: 165, 168-169) summarizes the age class distribution of southern yellow pine forests across the Southern Appalachian assessment area by a variety of land ownerships. Similar information is derived from queries of the Chattahoochee-Oconee National Forest CISC Database. Table 3- 54 provides a summary of this information.

Table 3- 54. Successional Stage Distributions For Southern Yellow Pine Forests Across Several Ownerships In The Southern Appalachian Assessment Area.

Successional Stage	Chattahoochee NF	Oconee NF	All Public Lands	All Private Lands	All Ownerships
Early Successional	5%	8%	10%	18%	16%
Sapling/Pole	25%	39%	9%	19%	18%
Mid- Successional	30%	46%	32%	59%	55%
Late-Successional (includes old growth)	40%	7%	49%	4%	11%

National Forest data is derived from the CISC Database. Data for other ownerships is derived from FIA and LANDSAT data

Several species of viability concern are associated with late-successional southern yellow pine forests maintained in open conditions by frequent fire (Appendix E). While public lands support the majority of late-successional acres, the structure and composition of these forests has been altered due to years of fire suppression resulting in less than optimal habitat conditions. Fire intolerant species such as Virginia pine have proliferated while other pines (shortleaf, pitch, table mountain, longleaf) have seen dramatic declines (NatureServe 2002, Martin et al 1993). In the absence of fire, hardwoods, shrubs, and vines have replaced the open, grassy, herbaceous layer that is characteristic of frequently burned areas, and hardwoods have encroached into the midstory further affecting forest structure. This change in forest structure and resulting habitat condition has had a direct effect on species dependent upon these communities. Several bird and reptile species associated with southern pine forests are in decline (Dickson 2001) as various habitat components are lost. The Red-cockaded woodpecker (RCW) is the only T&E species associated with the Southern Yellow Pine Habitat Association. The RCW was first listed as an endangered species in 1970. Clearing of Southern Forest has been the main reason for the species decline. RCW recovery opportunities exist following the guidance from the Record of Decision (ROD) *Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and its Habitat on National Forest in the Southern Region June 1995*. In addition to declines in species dependent upon specific habitat attributes, entire pine communities are in decline. Recent studies show that the acreage of table mountain pine communities (considered a rare community in the southern Appalachians) has decreased due to fire suppression (Turrill and Buckner 1995), and that many remaining examples have substantial hardwood invasion.

Management Indicators

Several management indicators have been identified for assessing effects to pine and pine-oak forest communities. These indicators include both key habitat variables and Management Indicator Species (MIS).

Key habitat variables to be monitored annually include the number of acres of pine forests burned, the number of acres of pine plantations restored to natural communities, and the total number of acres of pine forests restored. These activities together indicate the level of effort directed at maintaining or restoring pine and pine oak communities.

The pine warbler (*Dendroica pinus*) is closely associated with pine and pine-oak forests, generally occurring only where some pine component is present. It therefore is an appropriate indicator of the effects of management in restoring and maintaining pine forests. It should be noted, however, that this species does not discriminate as to the condition of pine stands relative to mid and understory, and so would indicate little more than the presence of pine. Therefore, pine warbler and various habitat-based elements, such as amount and effectiveness of prescribed burning, will be used to indicate effects of management on species associated with this community.

The following table shows the expected trends for the Pine Warbler based on the ability to create, maintain and enhance pine and pine oak habitats for this species on the forests.

Table 3- 55. MIS Trends for Pine Pine-Oak Habitats

Alternative/Units of Comparison	A	B	D	E	F	G	I
Pine Warbler (Chattahoochee Pine Pine-Oak Habitats)							
1st decade	=	=	=	=	–	=	=
5th decade	=	=	–	–	–	–	=
Pine Warbler (Oconee Pine Pine-Oak Habitats)							
1st decade	=	=	–	=	–	=	=
5th decade	+	+	+	=	–	+	+

[1] *Population trend expressed as expected change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "- -" = relatively large decrease.*

The red-cockaded woodpecker is selected as the MIS for mid- and late-successional pine and pine-oak forests. In addition to being a T&E species, the RCW is a good indicator of the desired conditions for this community type. The RCW's association with open, low mid-storied, fire-maintained pine forests makes this species the most appropriate indicator for mid- and late-successional pine and pine-oak forests.

The following table shows the expected trends for the RCW based on the ability to create, maintain and enhance mid- to late- successional pine and pine oak habitats for this species on the forests.

Table 3- 56. MIS Trends for Mid- to Late-Successional Pine Pine-Oak Habitats

Alternative/Units of Comparison	A	B	D	E	F	G	I
RCW (mid- and late-successional pine and pine-oak forest communities)							
1st decade	=	=	=	=	–	=	=
5th decade	+	+	+	+	–	+	+

[1] *Population trend expressed as expected change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "- -" = relatively large decrease.*

Direct and Indirect Effects

Abundance

The future distribution of pine and pine-oak forests on the Chattahoochee-Oconee National Forest will vary among alternatives in relation to management objectives for the maintenance and restoration of these community types. Table 3- 57 lists the expected activity levels related to maintenance and restoration of southern yellow pine forests by alternative for the Chattahoochee and Oconee National Forests.

Table 3- 57. Expected Activity Levels Related To The Maintenance And Restoration Of Southern Yellow Pine Forests On The Chattahoochee-Oconee National Forest

Objective By Forest and Vegetation Communities	Alt. A	Alt. B	Alt. D	Alt. E	Alt G	Alt. I
CHATTAHOOCHEE						
Prescribed Burn						
Shortleaf pine-Pitch pine-Table Mountain pine	3,090	3,360	3,690	2,550	2,160	3,750
Thinning						
Shortleaf pine-Pitch pine-Table Mountain pine	206	224	246	170	144	500
Hardwood Midstory Reduction						
Shortleaf pine-Pitch pine-Table Mountain pine	6,180	6,720	7,380	5,100	4,320	7,500
Restoration						
Shortleaf pine-Pitch pine-Table Mountain pine	103	112	123	34	17	210
Mtn Longleaf	103	112	123	34	17	110
OCONEE						
Prescribed Burn						
Shortleaf Pine	535	510	530	505	450	500
Loblolly (Outside RCW HMA)	1,070	1,020	1,060	1,010	900	1,100
Loblolly (Inside RCW HMA)	13,375	12,750	13,250	12,625	11,250	16,000
Thinning						
Shortleaf Pine	214	204	212	202	180	230
Loblolly (Outside RCW HMA)	107	102	106	101	90	3,500
Hardwood Midstory Reduction						
Shortleaf Pine	535	510	530	505	450	500
Loblolly (Outside RCW HMA)	535	510	530	505	450	1,100
Restoration						
Shortleaf Pine	107	102	106	101	90	110
Pine-Oak	107	102	106	101	90	110

Specific acre objectives for Table Mountain pine forests are presented in the Rare Communities section. For activity levels for RCW see RCW Effects Analysis.

The ability to meet these activity levels under each alternative varies based upon differences in the emphasis and subsequent management intensity of each alternative. To compare the potential level of maintenance and restoration activities among alternatives, the current distribution of southern yellow pine forests was compared with the prescription allocations for each alternative. Prescriptions were rated as to the management opportunity they provide for varying levels of vegetation management and prescribed burning (none, low, medium, and high). The proportion of existing mid- and late-successional southern yellow pine forests in each management opportunity level is shown in Table 3- 58 and Table 3- 59

Table 3- 58. Percentage Of Existing Mid And Late-Successional Southern Yellow Pine Forests On The Oconee NF In Each Management Opportunity Level By Alternative.

Alternative	Management Opportunity Level [1] None	Low	Moderate	High
Alternative A	0	1.8	19	79.1
Alternative B	0	4.1	19	76.8
Alternative D	0	5	15.8	79.1
Alternative E	5.8	0	38.1	56
Alternative F	0	0	17.6	79.3
Alternative G	3.7	12.4	27.9	56
Alternative I	3.7	2.8	29.7	63.9

[1]Forest communities defined by CISC forest type grouping in Table 3- 31
[2]Source: IMI analysis of using GIS stands data as modified for plan revision, Alt A-G 12/03/02; Alt I 8/23/03, Base year 2000.
[3] Management Opportunity Level: None: None-None
(Veg Mtg -Rx Fire) Low: None-Low, None-Medium, Low-Low
Mod: Low-Medium, Medium-Medium,
High: Medium-High, High-High

Table 3- 59. Percentage of Existing Mid- and Late-Successional Southern Yellow Pine Forests on the Chattahoochee NF in Each Management Opportunity Level by Alternative.

Alternative	Management Opportunity Level [1] None	Low	Moderate	High
Alternative A	11.8	14.6	26.1	47.6
Alternative B	11.7	3.5	22.9	6
Alternative D	12	11.5	5.9	70.7
Alternative E	12	11.5	59.4	17.1
Alternative F	9.1	2.3	3.5	84.9
Alternative G	16.4	37.3	34.1	12.2
Alternative I	9.8	8.2	30.5	51.6

[1]Forest communities defined by CISC forest type grouping in Table 3- 30
[2]Source: IMI analysis of using GIS stands data as modified for plan revision, Alt A-G 12/03/02; Alt I 8/23/03, Base year 2000.
[3] Management Opportunity Level: None: None-None
(Veg Mtg -Rx Fire) Low: None-Low, None-Medium, Low-Low
Mod: Low-Medium, Medium-Medium,
High: Medium-High, High-High

For the Chattahoochee National Forest, alternatives A, D, E, F and I provide opportunities for moderate to high levels of management on 70 percent or greater of the southern yellow pine acreage. For the Oconee National Forest all alternatives provide opportunities for moderate to high levels of management on 70 percent or greater of the southern yellow pine acreage. The high level of management opportunities on the Oconee is in response to management for the endangered Red-cockaded woodpecker.

Age Class Distribution and Forest Structure

Future age class distributions and forest structure will vary among alternatives due to the differences in management intensity and emphasis as shown above in Table 3-57. The ability to use fire as a management tool will play a critical part in restoring natural species assemblages and forest structure within the southern yellow pine communities.

As shown in Table 3- 57, opportunities exist to manipulate vegetation in southern yellow pine forests through prescribed fire and other vegetation management techniques under all alternatives. Projected activities should be sufficient to enhance existing habitat conditions within pine and pine-oak forests above their current levels. Longer rotation ages coupled with more frequent fire will enhance habitat attributes such as grassy understories and standing snags needed by several declining bird species (Dickson 2001). In 10 years, analysis indicates there will be a decline of pine and pine-oak acreages across all alternatives (Table 3- 60). With the exception of alternative F analysis indicates that under all alternatives, in 50 years this habitat element will be relatively abundant and well distributed on the Oconee National Forest. The Chattahoochee National Forest in 50 years will have declines in pine pine-oak habitats with the highest declines in alternatives D, E, F, G. Their will be slight declines in 50 years on the Chattahoochee National Forest in alternatives A, B and I.

Table 3- 60. Expected Change In Acreage Of Mid- And Late-Successional Pine Pine-Oak Forest On The Chattahoochee-Oconee NF, After 10 And 50 Years Of Implementing Forest Plan Alternatives

Alternative	Percentage Mid- and Late-Successional Pine Pine-Oak P1	P5
Chattahoochee NF		
A	-7.30%	-4.38%
B	-15.09%	-8.53%
D	-17.81%	-21.68%
E	-3.32%	24.87%
F	-23.68%	-26.21%
G	-0.45%	20.17%
I	-9.75%	-1.61%
Oconee NF		
A	-5.64%	19.07%
B	-2.10%	24.02%
D	-25.38%	28.87%
E	-2.59%	27.69%
F	-36.37%	-23.93%
G	-2.12%	39.85%
I	-1.91%	19.90%

Source : SPECTRUM model outputs, September 2003

Cumulative Effects

Pine and Pine-oak forests are common on the Chattahoochee-Oconee National Forest as well as on adjacent private and public lands. The distribution of age classes (Table 3- 54) varies considerably based upon ownership patterns, with the majority of older pine forests occurring on public lands. Management opportunities under all alternatives will ensure continued persistence of these communities on national forest lands with a focus on maintenance and restoration of natural species assemblages. Public lands already provide a vital function in providing the bulk of mid- and late-successional southern yellow pine forests and as restoration proceeds within these communities on national forest lands, the importance of these habitats to species of regional viability concern will increase.

Mixed Woodlands, Savannas, and Grasslands

Affected Environment

Permanent grasslands, savannas, and woodlands were once a frequent occurrence across the southeastern landscape on xeric ridge tops and south-facing slopes maintained with frequent fire or mowing (DeSelm and Murdock, 1993; Davis et. al, 2002). Habitat both in the Southern Appalachians and piedmont currently occurs primarily along roadside and power line rights-of-ways (Davis et. al., 2002). Habitat may also be found in areas managed for featured species such as the red-cockaded woodpecker and northern bobwhite quail. Although xeric woodlands, savannas, and grasslands were not addressed directly in the Southern Appalachian Assessment (SAA), "grass/shrub, old fields" were shown to occupy 4.1 percent of the assessment area (estimated using LANDSAT data).

Numbers of species of concern associated with open woodlands and grasslands, compiled as part of the Southern Appalachian Forest planning process, include 26 species on the Piedmont and 90 species in the Southern Appalachians. Of these, the majority are vascular plants (58 percent and 80 percent in the Piedmont and Southern Appalachians, respectively), followed by reptiles, birds, and insects.

The Chattahoochee-Oconee National Forest does not have any inventoried woodlands, savannahs or grasslands. Very small amounts of this community type exist on the Chattahoochee-Oconee National Forest. The efforts on the Forest would be focused on restoration and then maintenance of the restored communities. The SAA reports the occurrence of "grass/shrub, old fields" in the SAA assessment area (SAA Terrestrial Report, 1996). Additional inventories may indicate additional acreages in this community type. The Chattahoochee-Oconee National Forest has objectives to restore woodlands, savanna, and grassland.

Direct and Indirect Effects

Woodlands, savannas, and grasslands occur as mosaic within a fire-maintained landscape. Important maintenance and restoration issues and activities include the following:

- To restore the structure of these habitats, basal area reduction (less than 60ft.^{2}) is typically needed. Suitably low basal areas may be found in stands damaged by the southern pine beetle.
- Frequent prescribed fire (every 1-3 years) is important for reducing woody sprouting and to encourage herbaceous understories. Smoke management at urban interfaces will be a growing concern as cities expand and people increasingly live or commute in and around the National Forest.
- Suitable sites may be dominated by off-site species such as white pine or loblolly pine. Active restoration (through planting) of fire-associated forest types (shortleaf pine, xeric oaks, Table Mountain pine) and herbaceous

understories may be needed when a suitable seed source in proximity to the site is lacking.

The table below indicates the restoration objectives for the Chattahoochee-Oconee National Forests over the next decade.

Table 3- 61. Restoration Objectives for Woodland, Savanna, and Grassland on the Oconee and Chattahoochee National Forests

Restoration Objective By Forest	Alt. A	Alt. B		Alt. E	Alt G	Alt. I
Chattahoochee	1,030	1,120	1,230	340	170	1,000
Oconee	107	102	106	101	90	110

Maintenance and restoration of this habitat type is highly management-dependent, as described above. In addition to forest thinning and frequent prescribed fire, herbicide application or summer burning may be needed to encourage the dominance of herbaceous species in the understory of long forested stands. Restoration and maintenance of these conditions may require years of management to create the desired conditions.

Direct effects may result from the application of tools necessary for achieving the desired condition, as described above, and may also include herbicide application, summer burning, or planting. Some short-term negative direct effects may occur in association with restoration and maintenance activities including the incidental mortality of birds or reptiles while nesting or breeding, to the seed or root bank of plants occurring in the stands at the time of project activities, and to those individuals overlooked in the project area at the time that activities are implemented. Activities may temporarily set back plant and animal reproduction or growth.

Management Indicator Species

Historic woodland, savanna, and grassland communities on national forests will be the focus of restoration efforts involving reducing tree cover and restoring periodic fire. Over time, these activities are expected to create grass-dominated understories. The field sparrow (*Spizella pusilla*) is selected as a MIS because of its association with scattered saplings or shrubs in tall weedy or herbaceous cover (Hamel 1992). The field sparrow may be effectively monitored using established protocols. This species will help indicate community response to efforts to maintain and restore woodland, savanna and grassland communities. Monitoring will focus on presence of these species within restoration areas.

The field sparrow may have had greatest abundances in late 19th century after clearing of eastern forests. More recently, North American Breeding Bird Survey (BBS) data indicate annual survey-wide decrease -3.3 percent (N = 1621; P less 0.0) in the period 1966-1996 (Sauer et al. 1997). Management include providing shrub-dominated edge habitat adjacent to grassland or providing grassland with a shrub component (both of must which include dense grass and moderately high litter cover), and avoiding disturbances that completely eliminate woody vegetation. Avoid management practices that completely remove woody vegetation (Best 1979, Stauffer and Best 1980). Protect existing prairie remnants (Herkert 1994b).

The field sparrow is common in Georgia. On the Chattahoochee-Oconee National Forest field sparrow numbers are lower because the majority of the landscape is forested acres. Restoration of woodland, savanna and grassland communities will increase the amount of suitable habitats that are preferred by the field sparrow.

Cumulative Effects

The cumulative effects on the quantity and distribution of these habitats across the Southern Appalachian and Piedmont landscape was determined by evaluating maps of the xeric forest types (includes attributes used to predict the potential for old growth community types 22 and 24) in various vegetation management/prescribed fire modules, by alternative, and evaluating the sum of probable activities needed for restoration (thinning, prescribed fire) across the Southern Appalachian and piedmont forests undergoing plan revision. These maps and lists of probable activities are included as part of the process record available on each National Forest. The result of restoration and maintenance efforts is that in both the Southern Appalachian and Piedmont National Forests, oak, mixed or pine woodlands, savanna, or grassland habitats will be well-distributed in Alternatives B, I, and H, but less so in Alternatives A, E, and F. Without restoration and maintenance of this community type, this habitat will not be self-sustained. Oak, mixed or pine woodlands, savannas, and grasslands and species associated with this habitat will decline under all alternatives if there are predicted constraints to the prescribed fire program due to smoke management at urban interfaces.

RARE COMMUNITIES

Wetlands

Affected Environment

It is estimated that more than 50 percent of the nation's wetlands have been destroyed in the past 200 years (Ernst and Brown 1988). They have been ditched and drained for pastures, mined for peat (Ewel 1990), and filled for shopping centers. Loss of some wetlands can also be attributed to sedimentation, pollution, and plant succession due to fire suppression (U.S. Fish and Wildlife Service 1991).

Rare wetland communities include Mafic and Calcareous Fens, Sphagnum and Shrub Bogs, Swamp Forest-Bog Complex, Mountain Ponds, Seasonally Dry Sinkhole Ponds, and Beaver Pond and Wetland Complex as defined in the Southern Appalachian Assessment (SAMAB 1996: 179-185), and all Associations within the following Ecological Groups as defined by NatureServe (2001):

458-15	Appalachian Highlands Wooded Depression Ponds
458-20	Appalachian and Interior Highlands Limesink and Karst Wooded Ponds
470-10	Appalachian Highlands Forested Bogs
470-20	Appalachian Highlands Forested Acid Seeps
470-50	Appalachian Highlands Forested Fens and Calcareous Seeps
475-10	Appalachian Highlands Acid Herbaceous Seeps
475-20	Appalachian Highlands Alkaline Herbaceous Fens and Seeps
475-30	Appalachian and Interior Highlands Herbaceous Depression Ponds and Pond Shores

Bogs, fens, seeps, and ponds may be found in both the Appalachian and Piedmont regions, and are characterized by: 1) soils that are semi-permanently to permanently saturated as a result of groundwater seepage, perched water tables, rainfall, or beaver activity, but otherwise are generally non-alluvial, and 2) presence of wetland-associated species such as sphagnum, ferns, and sedges. Dominant vegetation may be herbs, shrubs, trees, or some complex of the three. Ponds in this group include limesink, karst, and depression ponds, which may hold areas of shallow open water for significant portions of the year.

Also included are all impoundments and associated wetlands resulting from beaver activity. (Artificial impoundments are not included, unless they support significant populations or associations of species at risk). Beaver activity has historically played an important role in creating open wetland habitats that are now rare on the landscape. Beaver wetlands are beneficial for many rare species such as monkey face orchid (Shea 1992), but may be detrimental to others such as bog turtle (Jensen, pers. comm). Beaver impoundments also may cause unacceptable impacts to facilities and other resources.

The primary management need for the above communities is protection from activities that could disrupt wetland hydrology or other community structures and functions. Some sites may also require periodic vegetation management to maintain desired herbaceous and/or shrubby composition.

River gravel-cobble bars and river scour areas are also considered to be rare wetland communities. They are characterized by: 1) sites adjacent to or within stream channels that are exposed to periodic flooding and scour, and 2) presence of significant populations or associations of species at risk. These communities may be found in both Appalachian and Piedmont regions. Primary management needs are protection from disturbance during development of road crossings, and maintenance of desirable in-stream flows. These communities include River Gravel-Cobble Bars as defined in the Southern Appalachian Assessment (SAMAB 1996: 183), and the rare Associations within the following Ecological Groups defined by NatureServe (2001):

457-10 Appalachian Highlands Riverine Vegetation
457-30 Rocky Riverbeds
457-40 Appalachian Highlands Riverscour Vegetation

The SAA Terrestrial Report summarizes the approximate number of occurrences of some of these wetland communities on National Forest lands in the Southern Appalachians (SAMAB 1996: 190). Several species of viability concern are associated with wetland rare communities, and are listed in Appendix E, Tables L1 and L2.

Rare wetland communities on the Chattahoochee-Oconee National Forests are as follows:

1. Bogs, Fens, Seeps and Seasonal Ponds:

   a. Shrub-dominated and sphagnum-herb dominated bogs (SAMAB 1996: 184-185) are known to be present on the Chattahoochee NF. Documented examples occur on the Tallulah and Brasstown Ranger Districts and include Tom's Swamp, Wolf Creek Bog, and Cooper's Creek Bog.
   b. Numerous examples of acid herbaceous seeps (NatureServe 2001) are present across the Chattahoochee NF. These are generally small, usually less than an acre in size.
   c. Unique examples of wooded depression ponds (NatureServe 2001) are present on the Oconee NF, and are known as the Monticello and Gladesville Glades. These sites occur over gabbro-derived clays, and are seasonally flooded. The Oconee NF also has an example of a seasonally-flooded sweetgum-red maple pond as defined by NatureServe (2001).

2. Open Wetlands and Beaver Ponds:

There are numerous examples of the beaver ponds and wetland complex (SAMAB 1996: 179) across the Chattahoochee-Oconee National Forest, occurring on all Districts.

3. River and Stream Channels and Banks:
A documented example of the Appalachian Highlands River scour Vegetation community (NatureServe 2001) is present on the Chattahoochee NF along the Chattooga River.

<u>Direct and Indirect Effects</u>

Wetland rare communities will be managed under all alternatives under the 9.F Rare Community Prescription for protection, maintenance, and where possible, restoration. These wetlands generally fall within riparian corridors, so provisions of the Riparian Prescription also will apply. Standards under all alternatives provide for protection of hydrologic function of wetland rare communities, and prohibit fish stocking to maintain suitability for amphibian breeding. Beaver-created wetlands will normally be treated as rare communities, but beaver populations and impoundments could be managed to avoid adverse impacts to public safety, facilities, private land resources, at-risk species, and other rare communities.

Because wetland rare communities will be protected and maintained in all alternatives, no adverse direct or indirect effects to these communities are expected. Restoration efforts and creation of new wetlands through beaver activity may result in increased occurrence of these communities to the benefit of associated species. However, analysis indicates that under all alternatives, wetland rare communities will remain uncommon on the forest because of their naturally limited distribution.

<u>Cumulative Effects</u>

Because all alternatives place priority on protection and maintenance of these communities, cumulative effects on National Forest lands are expected to be positive. However, a significant proportion of Southern Appalachian wetland rare communities are located on private lands (SAMAB 1996: 190) where protection may be poorly regulated and they are vulnerable to destruction. For these reasons, protection of these habitats on National Forest land is important to maintaining viability of associated species within the region.

Glades, Barrens, and Associated Woodlands

Affected Environment

Glades, barrens, and associated woodlands are characterized by thin soils and exposed parent material that result in localized complexes of bare soil and rock, herbaceous and/or shrubby vegetation, and thin, often stunted woods. During wet periods they may include scattered shallow pools or areas of seepage. They vary widely in species composition depending on the type of underlying parent material. They differ from rock outcrop communities by exhibiting some level of soil and vegetation over the majority of the site. Field delineations should include the entire complex of characteristic vegetation composition and structure. These communities may be found in both Appalachian and Piedmont regions. Primary management needs are protection from recreational impacts and non-target management disturbance. Periodic vegetation management, especially prescribed fire, may be necessary to maintain or restore desired herbaceous and/or shrubby composition. These communities include Calcareous Woodlands and Glades, Mafic Woodlands and Glades, Serpentine Woodlands and Glades, and Shale Barrens as defined in the Southern Appalachian Assessment (SAMAB 1996), and the rare Associations within the following Ecological Groups as defined by NatureServe (2001a):

401-17	Appalachian Highlands Calcareous/Circumneutral Dry-Mesic Hardwood Forests and Woodlands
440-05	Appalachian Highlands Carbonate Glades and Barrens
440-10	Interior Highlands Carbonate Glades and Barrens
440-25	Appalachian Sandstone Glades and Barrens
440-40	Appalachian Shale Glades and Barrens
440-65	Appalachian Serpentine Woodlands
440-80	Appalachian Mafic Igneous/Metamorphic Glades and Barrens

The SAA (1996) concluded that only 25 percent of the known occurrences for species associated with mafic and other calcareous habitats, occurred on National Forest lands. Occurrence data for these communities on National Forest land is limited. Numbers of species of concern associated with rare glades, barrens, and woodlands include 17 species on the piedmont and 110 species in the Southern Appalachians. The majority are vascular plants (88 percent and 91 percent in the Piedmont and Southern Appalachians, respectively) followed by insects and reptiles. On the Chattahoochee-Oconee National Forests, 1 of the Piedmont species and 20 of the Southern Appalachian species exhibit viability concerns.

The Southern Appalachian Assessment (SAA) reports the occurrence of one calcareous woodland/glade in Georgia (SAA Terrestrial Report, pg. 188 table C-19, 1996), however the Chattahoochee-Oconee National Forest does not have any glades, barrens, or woodlands inventoried. The direction in the Forest Plan is to inventory the forest for occurrences of rare communities. Inventories may indicate additional acreages in this rare community type. If these rare communities are identified, direction will be taken to restore and maintain these communities.

Although rare communities will be protected or restored across all alternatives, the following management and restoration issues are specific to glades, barrens, and associated woodlands:

- Lack of inventory information.
- Communities may require active restoration, such as basal area reduction (less than 60ft.^{2}), or mechanical and chemical methods of woody understory and mid-story control.

Direct and Indirect Effects

As stated above, rare communities (see management prescription 9.F) will be protected or restored across all alternatives so the effects of National Forest management on these communities and associated species is expected to be positive. Many rare communities of this type are likely to be overgrown or in need of some level of restoration. Small direct effects could occur as a result of active restoration activities, which may temporarily alter the timing of reproduction or growth, but indirect effects are likely to be positive across all alternatives.

Since community inventories will primarily be conducted in project areas, alternatives with fewer anticipated projects (Alternative G) may result in the discovery and consequent restoration of fewer rare communities.

Cumulative Effects

The cumulative effect on the quantity and distribution of these rare communities is predicted by considering trends in the status of these communities through time and across private and public ownerships. Our ability to protect and restore these communities on National Forest land is limited by knowledge regarding their occurrence on the landscape. The cumulative effect of all plan alternatives is anticipated to be increasingly positive as we gain more information regarding their distribution and abundance on the National Forests, given we continue to restore and protect them as specified in this Forest Plan.

Canebrakes

Affected Environment

Although at the time of European settlement, canebrakes were common in the Southeast, they rapidly disappeared following settlement due to factors such as overgrazing, clearing of land for farming, altered burning regimes, and changes in floodplain hydrology (Brantley and Platt, 2001). Faunal surveys in canebrakes are quite limited and canebrake ecology has been largely ignored by contemporary workers (Platt and Brantley 1997). At least six species of butterfly may be canebrake obligates (Scott 1986, Opler and Malikul 1992), and five of the six are thought to be declining due to destruction of cane habitat (Opler and Malikul 1992). In the Coastal Plain and Piedmont, canebrakes also provide habitat for nesting Swainson's warbler (*Limnothlypis swainsonii*), a bird that is threatened by destruction of this habitat (Hamel 1992, Brown and Dickson 1994).

Canebrakes are characterized by almost monotypic stands of giant or switch cane (*Arundinaria gigantea*), usually with no, or low densities of overstory tree canopy. They are typically found in bottomlands or stream terraces. This community is found in the Appalachian, Piedmont, and Coastal Plain regions. Primary management needs are restoration and maintenance through overstory reduction and periodic prescribed fire. Although several Associations described by NatureServe (2001) include cane as a major component, this community most closely corresponds to:

CEGL003836 Floodplain Canebrake

The Draft effects analysis for canebrakes stated that there are approximately 10 acres of existing and potential canebrakes on the Chattahoochee National Forest, and approximately 130 acres on the Oconee (N. Klaus pers. comm.). Through in-house and public comments on the Draft Plan, the Forest decided to increase these acreages to 50 for the Chattahoochee, and 180 for the Oconee.

Several species of viability concern can occur in canebrakes (Appendix E, Tables L1and L2). There are 16 of these listed as viability concern species for the Southern Appalachian Ecoregion. Five potentially occur on the Chattahoochee (3 plants, 1 bird, 1 snake). Four species of viability concern are listed for the Piedmont Ecoregion. Of these, a snake is the only species with potential to be present on the Oconee.

Direct and Indirect Effects

Cane commonly occurs as an understory component in bottomlands and stream terraces throughout the Forest. However, management of these communities will apply only to larger patches (generally greater than 0.25 acres) exhibiting high densities that result in nearly monotypic conditions, or to existing cane areas selected for restoration of such conditions. All existing canebrake communities meeting this definition will be managed for protection and maintenance under all alternatives. Direct effects will be those of management activities conducted to restore and maintain the canebrakes. These management options will include overstory and midstory removal to restore declining stands of cane, as well as prescribed burning and/or herbicide treatment to control competing herbaceous and woody vegetation and restore culm vigor.

By conducting the prescribed burns on a 7 to 10 year interval, impacts to the canebrake should be beneficial. More frequent fires eventually result in death of the plants (Platt and Brantley 1997). Prescribed burning will be carried out following standards for prescribed fire, including prohibition of fireline construction in rare communities. Overstory and midstory removal, where needed for restoration, will be conducted under the standards and guidelines developed for rare communities, thus preventing direct adverse effects to the canebrakes during implementation of the vegetation removal. Through habitat improvement, restoration and maintenance of canebrakes will result in long-term beneficial effects to the species associated with the communities.

There are approximately 50 acres believed to be present on the Chattahoochee that have potential for canebrake restoration. These acres will be restored by overstory removal and prescribed fire. There is a small area of existing cane along the Etowah River that is in need of maintenance through prescribed burning. On the Oconee, there are approximately 150 acres of canebrakes with potential for restoration through overstory removal and prescribed fire. In addition, approximately 30 acres of existing forested canebrakes on the Oconee are in need of maintenance, primarily by prescribed burning (N. Klaus, pers. comm). This maintenance and restoration will be conducted on the Chattahoochee-Oconee National Forest over the next 10 years.

Canebrakes generally fall within riparian corridors and therefore, will be subject to Riparian Prescription provisions. Rare Community Prescription standards in all alternatives will ensure recreation use does not negatively impact these sites. Non-native invasive species will be controlled and livestock grazing will be excluded from existing canebrakes and areas selected for canebrake restoration.

Canebrake communities will be protected, maintained and restored in all alternatives, and thus no adverse direct or indirect effects to these communities are expected. Trends in abundance and condition of canebrakes will be positive under all alternatives due to focus on maintenance and restoration of this community.

<u>Cumulative Effects</u>

Because priority will be put on protection, maintenance and restoration of canebrake communities, effects of National Forest management on them and their associated species are expected to be beneficial under all alternatives. However, because of relatively low levels of restoration expected under all alternatives, coupled with current rarity of the habitat, canebrake communities are expected to remain rare for the foreseeable future relative to their historical distribution. This rarity, and the fact there is little if any effort to restore canebrakes on private lands, makes these habitats critical to maintain where they occur on Forest Service land.

Caves and Mines

Affected Environment

This community is characterized by natural and human-made openings in the ground that extend beyond the zone of light, creating sites buffered in relation to the outside environment. Included are karst and sinkhole features and sinking streams that lead to subterranean environments. Surfaces of karstlands are directly linked to cave water systems and aquifers (Kastning and Kastning 1990).

The shape and location of entrances, along with the hydrology, configuration, size, elevation, and patterns of airflow influence the types of fauna found within caves and mines (SAMAB 1996: 180). Many bats are dependent on caves, both seasonally and year-round. Bats select roosts with temperatures appropriate to their metabolic processes (Tuttle and Stevenson 1977). An intermediate, unusable range of temperatures characterizes most caves. Bats use only a very small number of the caves that have desirable conditions.

In the Southern Appalachians, most caves are found in carbonate valleys of the Ridge and Valley and the Cumberland Plateau (SAMAB 1996: 180). The Blue Ridge contains fissure caves and a smaller number of solution caves found in limestone or dolomite collapsed valleys and windows. Because of their rarity and vulnerability, cave protection is a key conservation need within this region (SAMAB 1996: 37). Sinkholes and karstlands are scattered throughout the planning area, and large examples are rare. They are most common in the Northern and Central Ridge and Valley (Jefferson National Forest), as well as the Cumberland Plateau (Bankhead National Forest), with fewer occurrences known from the Blue Ridge (SAMAB, 1996: 189). Another variety of caves known as tectonic caves, are formed by cracking and movement of rock layers, resulting in open spaces. The similar boulder or talus caves consist of openings between boulders and talus piled up at the base of a cliff or slope. These cracks may extend hundreds of feet beneath the rock piles (Beck 1980).

Abandoned mines have become key year-round resources for bats displaced from natural roosts, such as caves and large hollow trees, by human disturbance (Tuttle and Taylor 1994). Abandoned mines may provide microclimates similar to those of caves. Mines are used for maternity sites, hibernation sites, migratory stopover sites, and temporary night roosts. Some bats rely heavily on use of mines range wide, and many bat species are believed to hibernate exclusively in old mines or caves (Tuttle and Taylor 1994).

Karst formations are not present on the Chattahoochee-Oconee National Forest. In the Georgia Ridge and Valley, National Forest lands are located primarily on the sandstone ridges, with private land occurring in the limestone valleys. There is no National Forest land in Georgia located in the Cumberland Plateau. Therefore, the limestone solution caves that provide habitat for bat species such as the gray bat, are not present on the Forest. However, a few tectonic and talus caves are present on the Chattahoochee. Several old corundum, gold, and iron ore mine shafts and tunnels are also present, many of which are dangerous and inaccessible. Examples of these caves and/or mines are present on all Districts of the Chattahoochee-Oconee.

Direct and Indirect Effects

Possible threats to National Forest caves and mines are 1) direct disturbance from human visitation or improperly installed gates/closure devices, 2) management activities that indirectly result in alteration of temperature, humidity, surface water recharge or water quality, and 3) temporary decline in air quality due to prescribed burning (SAMAB 1996:90).

Forest wide standards will provide for protection of caves and mines from human disturbance through proper gating and prohibition of camping and campfires at entrances to significant caves and mines. In addition, the standard for identifying caves and mines as smoke sensitive targets and planning to avoid them when developing prescribed burn plans, will mitigate effects of prescribed burning.

Management actions that may result in indirect effects by altering temperature, humidity, surface water recharge or water quality within caves or mines include vegetation clearing and management, construction of roads, trails and other recreation developments, and other use of heavy equipment. Standards under all alternatives will provide for undisturbed buffers around significant caves, mines, and associated features to maintain vegetative cover and moist microclimatic conditions. Prohibited activities within the buffer include vegetation cutting, recreation site development, and construction of roads, skid trails and log landings.

Provisions of the Rare Community Prescription (9.F), as well as additional forest wide standards for bats, will apply to caves and mines that support cave-associated species, and will be the same across all alternatives. If caves containing federally listed bats are found on the Forest, USFWS will be notified and consulted, with additional protection standards put in place as necessary. Because of the priority put on protection of this community and associated species, effects of National Forest management is expected to be positive under all alternatives.

Cumulative Effects

Caves and other karst features are naturally rare elements. Mine shafts are also uncommon and provide important habitat for bats and other species. A significant proportion of Southern Appalachian caves (95 percent) are located on private lands (SAMAB 1996: 37, 49), where protection may be poorly regulated. For these reasons, effects of protection of these habitats on National Forest land is important to maintaining viability of associated species within the region.

Table Mountain Pine

Affected Environment

This community is characterized by a dominant or significant component of Table Mountain Pine (*Pinus pungens*) in the overstory often in combination with pitch pine (*Pinus rigida*). It is found in the Appalachian region. Primary management needs are maintenance and expansion of existing occurrences, using thinning and prescribed fire. This community corresponds to Table Mountain Pine/Pitch Pine Woodlands as defined in the Southern Appalachian Assessment (SAMAB 1996:185-186), and all Associations within the following Ecological Group as defined by NatureServe (2001a):

401-80 Appalachian Highlands Pitch and Table Mountain Pine Woodlands.

In Table Mountain Pine stands of the Great Smoky Mountains, associated tree species are red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*), pitch pine, sourwood (*Oxydendrum arboreum*), and chestnut oak (*Quercus prinus*). In Table Mountain Pine-pitch Pine stands, additional associated species include scarlet oak (*Quercuscoccinea*), American chestnut (*Castanea dentata*), and black locust (*Robinia pseudoacacia*) (Burns and Honkala 1990).

The lower canopy vegetation in Table Mountain Pine stands includes rosebay rhododendron (*Rhododendron maximum*), Catawba rhododendron (*R. catawbiense*), Piedmont rhododendron (*R. minus*), mountain-laurel (*Kalmia latifolia*), mountain winterberry (*Ilex montana*), hobblebush (*Viburnum alnifolium*), blueberries (*Vaccinium* spp.), sawbrier (*Smilax glauca),* greenbrier (*S. rotundifolia*), fetterbush (*Pieris floribunda*), white-alder (*Clethra acuminata*), black huckleberry (*Gaylussacia baccata*), bear huckleberry (*G. ursina*), wild grape (*Vitis* spp.), and male blueberry (*Lyonia ligustrina*). Mean shrub cover in the Great Smoky Mountains amounted to 65 percent in Table Mountain Pine stands and 84 percent in Table Mountain Pine-pitch Pine stands. (Burns and Honkala 1990).

Bear oak (*Quercus ilicifolia*), mapleleaf viburnum (*Viburnum acerifolium*), and low sweet blueberry (*Vaccinium angustifolium*) are most important stand components only in the northern part of the range of Table Mountain Pine.

Previous studies of Table Mountain Pine regeneration following wildfires suggest that prescribed fires need to be of high intensity to remove the forest canopy and expose mineral soil for successful regeneration (USDA 1965, Zobel 1969, Sanders 1992). Several recent studies suggest that although fire is needed for regeneration of Table Mountain Pine stands, the intensity may vary depending on site conditions. Medium-high intensity burns may get desired results (Welch and Waldrop 2001).

Table Mountain Pine has a very limited distribution the Chattahoochee-Oconee National Forest. There are approximately 304 acres of Table Mountain Pine stands, which is less than 1 percent of the Forest. Approximately 48 acres (14 percent) of the existing Table Mountain Pine stands are in early successional conditions and 286 acres (86 percent) are in mid- to late-successional habitat conditions. The distributions of Table Mountain Pine communities on the Chattahoochee-Oconee National Forest are concentrated in the eastern portion of the Forest on the Tallulah and Chattooga Ranger Districts.

Direct and Indirect Effects

Table Mountain Pine forests are considered a rare community and are protected in all plan alternatives through the rare community prescription (9.F). There also are specific standards and management direction to maintain and restore this species on those sites where Table Mountain Pine occurs. Table Mountain Pine stands will be protected, maintained or restored on appropriate sites and will not be cut or treated during vegetation management activities in order to maintain future restoration opportunities.

Table 3- 62. Estimated Annual Average Treated Acres By Forest, Objective, and Alternative

Objective By Forest and Vegetation Communities	Alt. A	Alt. B	Alt. D	Alt. E	Alt G	Alt. I
CHATTAHOOCHEE						
Prescribed Burn						
Shortleaf pine-Pitch pine-Table Mountain pine	3,090	3,360	3,690	2,550	2,160	3,750
Table Mountain pine	103	112	123	85	72	200
Thinning						
Shortleaf pine-Pitch pine-Table Mountain pine	206	224	246	170	144	500
Hardwood Midstory Reduction						
Shortleaf pine-Pitch pine-Table Mountain pine	6,180	6,720	7,380	5,100	4,320	7,500
Table Mountain pine	103	112	123	85	72	100
Restoration						
Shortleaf pine-Pitch pine-Table Mountain pine	103	112	123	34	17	210
Table Mountain pine	52	56	62	17	8	100

Table 3- 62 and Table 3- 63 indicate that all alternatives would provide some opportunity to manage for Table Mountain Pine on the Chattahoochee-Oconee National Forest. Alternative G would have the most limited opportunities to manage for Table Mountain Pine, while Alternative B would provide the highest opportunities to manage for this community. All alternatives, would allow sufficient management opportunities to maintain and enhance Table Mountain Pine communities on the Forest. Restoration and maintenance activities would benefit this community, however Table Mountain Pine forests will remain rare and poorly distributed on National Forest lands due to their naturally limited distribution.

Table 3- 63. Percentage of Table Mountain Pine in Management Opportunity Level by Alternative for Chattahoochee NF

	Management Opportunity Level [1]			
Alternative	**None**	**Low**	**Moderate**	**High**
A	9.6	30.0	54.6	5.8
B	9.6	23.0	30.6	36.9
D	22.2	23.0		54.9
E	22.2	23.0	24.3	30.6
F	9.5	0	0	90.4
G	22.2	77.9	0	0
I	9.6	23.3	42.8	24.3

1 Management Opportunity Level (Veg Mtg -Rx Fire): None: None-None
Low: None-Low, None-Medium, Low-Low
Mod: Low-Medium, Medium-Medium,
High: Medium-High, High-High

** Alternative F is the current plan, which has no objectives for Table Mountain Pine.*

Cumulative Effects

Table Mountain Pine is limited in distribution on the Chattahoochee National Forest and is concentrated in relatively small areas typically with small acreages. Recent forest surveys for northern Georgia indicate that there are approximately 3,700 acres of Table Mountain Pine on non-industrial private land (Thompson 1998). However, these private lands are the least likely to be actively managed and therefore existing Table Mountain Pine stands are expected to decline over time due to hardwood encroachment and lack of pine regeneration. Although limited in acreage, the maintenance and restoration of this community on National Forest lands remains critical to perpetuate this forest type.

Rock Outcrops and Cliffs

Affected Environment

Rock outcrops and cliffs are defined here as rare communities and include the following types of communities as defined in the Southern Appalachian Assessment (SAMAB 1996:179-186), and by NatureServe (2001).

Talus Slopes

This community is characterized by non-vegetated or sparsely vegetated rock accumulations at 2,500 to 4,600 feet elevation. It is found in the Appalachian region and is distinguished from Forested boulderfields by the lack of trees, and from rocky summits by its occurrence on side slopes as opposed to ridges and peaks. This community includes Talus Slopes as defined in the Southern Appalachian Assessment (SAMAB 1996:186), and all Associations within the following Ecological Group as defined by NatureServe (2001):

430-10	Eastern Acid Talus

Forested Boulderfields

This community is characterized by rock fields found at 3,500 to 5,300 feet elevation that support a variable density of trees, typically dominated by yellow birch. It is distinguished from talus slopes by the presence of trees, and is found in the Appalachian region. This community includes Boulderfields as defined in the Southern Appalachian Assessment (SAMAB 1996:179), and the following Associations as defined by NatureServe (2001):

CEGL004982	Southern Appalachian Hardwood Boulderfield Forest (Typic Type)
CEGL006124	Southern Appalachian Boulderfield Forest (Currant and Rockcap Fern Type)

Cliffs and Bluffs

These communities are characterized by steep, rocky, sparsely-vegetated slopes, usually above streams or rivers. Cliff communities may be dry or wet, and include communities associated with waterfalls, such as spray cliffs and rock houses. These communities are found in the Appalachian region. They include Calcareous Cliffs, Mafic Cliffs, Sandstone Cliffs, and Spray Cliffs as defined in the Southern Appalachian Assessment (SAMAB 1996:179,182,183,185), and all Associations within the following Ecological Groups as defined by NatureServe (2001):

430-40	Eastern Dry Acid Cliffs
430-45	Eastern Moist Acid Cliffs
430-50	Eastern Dry Alkaline Cliffs
430-55	Eastern Moist Alkaline Cliffs
430-60	Appalachian Highlands Northern White-Cedar Bluffs
430-65	Appalachian Highlands Rock Houses

Rock Outcrops

These communities are characterized by significant areas of exposed, usually smooth, exfoliating granite or related rocks, with scattered vegetation mats and abundant lichens. These communities are found in both the Appalachian and Piedmont regions. They include Granitic Dome and Granitic Flatrock as defined in the Southern Appalachian Assessment (SAMAB 1996:180-181), and all Associations within the following Ecological Groups as defined by NatureServe (2001):

435-10 Appalachian Highlands Granitic Domes
435-20 Appalachian Highlands Grantic Flatrock

Rocky Summits

This community is characterized by sparsely vegetated outcrops of fractured, irregular rock found above 4,000 feet elevation on peaks, ridges, and upper slopes. It is distinguished from rock outcrop communities by its fractured, irregular rock surface, and from talus slopes and cliff communities by its topographic position on or near summits. It differs from forested boulderfields in its general lack of forest cover. This community is found in the Appalachian region. It includes High Elevation Rocky Summits as defined in the Southern Appalachian Assessment (SAMAB 1996:182), and all Associations within the following Ecological Group as defined by NatureServe (2001):

436-30 Appalachian Highlands Rocky Summits

The known distribution of rare rock outcrop and cliff communities is described in the Southern Appalachian Assessment Terrestrial Technical Report (SAMAB 1996:188-190). According to this source, approximately one third of all occurrences of these communities in the Southern Appalachian area are located on National Forest lands.

Several examples of rock outcrop and cliff rare communities are found on the Chattahoochee National Forest:

1. Forested Boulderfields
Documented examples of boulderfield forests are present on Spaniards Knob, Sosebee Cove, Dismal Cove, Brasstown Bald, Coosa Bald, Hightower Bald, Tray Mountain and Black Mountain on the Brasstown Ranger District, and Rich Mountain on the Toccoa District.

2. Cliffs and Bluffs
Examples of various types of dry and wet cliffs and bluffs occur on all Districts of the Chattahoochee. Spray cliffs are present primarily on the Tallulah Ranger District along the Chattooga River.

3. Rock Outcrops
Examples of rock outcrops as defined above, occur on all Districts of the Chattahoochee NF. These include Buzzard Rock Cliffs and Cedar Cliffs on the Tallulah, Yonah Mountain on the Chattooga, and Blood Mountain on the Brasstown.

4. Rocky Summits
   A documented example of Appalachian Highlands Rocky Summits is Almond Bald on the Tallulah Ranger District.

Species of viability concern associated with rock outcrop and cliff communities on the Chattahoochee are listed in Appendix E, Table L1.

<u>Direct and Indirect Effects</u>

Rock outcrop and cliff communities are considered rare communities and would be managed optimally for protection, restoration, and/or maintenance through the Rare Community Prescription (9.F). They are protected from any negative effects of management actions, recreation activities, and invasive, non-native species. Mature forest cover is maintained at the top and base of cliffs to provide habitat for cliff associated species. This direction is the same under all plan alternatives. A subset of these communities is associated with riparian areas (spray cliffs, waterfalls, etc.), providing them with the additional protection afforded by the Riparian Corridor Prescription (11) under all Plan alternatives. Primary management strategies for these communities under all alternatives would be protection from disturbance by management activities and recreational uses. Little to no vegetation management for maintenance or restoration is expected. Because of the objectives and standards for these communities, the effects of National Forest management on rock outcrops, cliffs, and associated species would be expected to be positive.

<u>Cumulative Effects</u>

These communities will remain rare and poorly distributed on National Forest lands due to their naturally limited distribution. Cumulatively, these communities are vulnerable to negative impacts on private lands, making National Forest sites critical to maintain.

High Elevation Balds

Affected Environment

These communities are of two types: grassy balds and shrub (or heath) balds. Grassy balds are characterized by extensive areas dominated by herbaceous vegetation at high elevations (generally above 5,000 feet). They generally are found on ridge tops, domes, and gentle slopes. Shrub balds are typically found on steep exposed slopes and ridges at elevations ranging from 2,000 to 6,500 feet, and are characterized by dominance of ericaceous shrubs. These communities are found in the Appalachian region. Primary management needs are protection from recreational impacts and maintenance of desired vegetation using a variety of methods. This community includes Grassy Balds and Heath Balds as defined in the Southern Appalachian Assessment (SAMAB 1996: 181-182), and all Associations within the following Ecological Groups as defined by NatureServe (2001a):

436-10	Appalachian Highlands Grassy Balds
436-20	Appalachian Highlands Shrub Balds

Some environmental factors that occurred historically on heath balds include, high precipitation, extreme cold, frequent fog and wind. Conditions typically occurring on grassy balds include strong wind, high rainfall, frequent fog and extremes of temperature and moisture. Species composition varies regarding topographic features, moisture, exposure, types of disturbances and land use history. Oat grass tends to dominate the drier sites, while sedge tends to dominate the moist sites. One of the more distinctive characteristics of a grassy bald in relation to other high elevation communities is that it has extensive ranges dominated by herbaceous vegetation. (SAMAB 1996: 181-182)

The known distribution of rare grassy and heath bald communities is described in the Southern Appalachian Assessment Terrestrial Technical Report (SAMAB 1996:188-190). This report indicates that approximately two-thirds of the occurrences of grassy balds and nearly one half of the occurrences of heath balds in the southern Appalachian area are located on national forest lands.

Many species of viability concern are associated with grassy and shrub bald communities (See Appendix E for species associated with High Elevation Balds).

The Georgia Natural Heritage program recognizes four shrub balds in Georgia (Jon Ambrose, pers. comm.). All are on the Chattahoochee National Forest and include Brasstown Bald, Rabun Bald, Blood Mountain, and Tray Mountain. There are no existing grassy balds in Georgia.

Direct and Indirect Effects

Balds are considered a rare community and would be managed and protected under all alternatives through the 9.F (rare community) prescription. For those balds that fall within existing or recommended Wilderness (Prescriptions 1.A and 1.B), restoration activities could occur, but these allocations could limit the available methods and the degree of restoration activities. High elevation balds would be managed to maintain or restore bald characteristics including species composition, successional stages desired and occurrences of threatened or endangered species. Bald restoration would involve the use of tools such as thinning, mechanical treatments, herbicide release and prescribed burning (Saunders 1980).

Blood Mountain and Tray Mountain are in existing Wilderness Areas. The Rabun Bald area is allocated to 1.B (Recommended Wilderness Study Areas) in Alternatives D, E, and G. The balds in designated or recommended Wilderness still would be maintained and restored to the extent compatible with wilderness values. Much of Brasstown Bald has been permanently altered by a major visitor center complex, which also may limit restoration opportunities. However, in all alternatives, these balds are allocated to prescriptions that allow levels of management that would be sufficient to maintain or restore these rare communities. Restoration and maintenance of balds would benefit these communities, however they will remain rare and poorly distributed on National Forest lands due to their naturally limited distribution and constraints on the ability to manage as described above.

Cumulative Effects

On the Chattahoochee National Forest, shrub balds are few in number, patchy in distribution, and are typically located in areas with small acreages. The limited number of recognized shrub balds in Georgia all occur on National Forest lands. In Georgia, all of the lands above 4000 ft in elevation occur on National Forest lands and therefore, the perpetuation of this community is contingent on maintenance and activities on national forest lands.

Basic Mesic Forests

Affected Environment

Basic mesic forests (“rich coves”) are characterized by closed-canopy deciduous overstories and rich, diverse understories of calciphilic herbs, underlain by high-base geologic substrates. These communities are inherently rare due to the scarcity of high-base substrates both in the Southern Appalachians and the Piedmont, and should be differentiated from acidic coves, which lack the rich and diverse herbaceous understory flora. There are 817 acres of basic mesic forests on the Chattahoochee National, and none on the Oconee National Forest.

Basic mesic forest communities are found in both the Appalachian and Piedmont regions. Only prime examples of these communities, as identified in the forest-wide rare community database, are managed under the Rare Community Prescription (9.F.). Primary management needs are protection from non-target management disturbance. This community includes the following Associations defined by NatureServe (2001a, 2001b):

CEGL007711	Southern Appalachian Cove Forest (Rich Foothills Type),
CEGL007695	Southern Appalachian Cove Forest (Rich Montane Type),
CEGL008442	Shumard Oak-Chinquapin Oak Mesic Limestone Forest
CEGL008466	Basic Piedmont Mesic Mixed Hardwood Forest
CEGL008488	Southern Ridge and Valley Basic Mesic Hardwood Forest
CEGL004542	Piedmont Rocky Mesic Mafic Forest.

The SAA (1996) combined mesic and xeric mafic communities, and concluded that only 25 percent of the known occurrences for species associated with mafic and other calcareous habitats, occurred on National Forest land. Numbers of species of concern associated with basic mesic forests include 5 species on the Piedmont and 29 species in the Southern Appalachians. The majority are vascular plants (100 percent and 93 percent in the Piedmont and Southern Appalachians, respectively). On the Chattahoochee-Oconee National Forest, 18 of the Southern Appalachian species exhibit viability concerns (See Appendix E for species associated with Basic Mesic).

Direct and Indirect Effects

As stated above, rare communities will be protected or restored across all alternatives, so the effects of National Forest management on these communities and associated species will be positive. Occurrences for many of these rare communities are already known. These rare communities require only low intensity, low frequency disturbance, and are probably most threatened by recreational use since many are desirable sites for interpretive trails. Alternative E, which emphasizes recreation, may have the greatest impact on species associated with these communities.

Cumulative Effects

The cumulative effect on the quantity and distribution of basic mesic is predicted by considering trends in the status of these communities through time and across private and public ownerships. As people increasingly use the National Forest for recreational or social needs, impacts on basic mesic forests are expected to increase. Given that we continue to protect and restore these communities on the National Forest, it is anticipated that the cumulative effects will be positive.

SUCCESSIONAL STAGE HABITATS

Successional Forests

Affected Environment

Successional stages of forests are the determining factor for presence, distribution, and abundance of a wide variety of wildlife. Some species depend on early-successional forests, some depend on late-successional forests, and others depend on a mix of both occurring within the landscape (Franklin 1988, Harris 1984, Hunter et al. 2001, Hunter 1990, Litvaitis 2001). These habitat conditions are also important as wintering and stopover habitats for migrating species (Kilgo et al. 1999, Suthers et al. 2000, Hunter et al. 2001). Therefore, it is important that varying amounts of both types of habitat be provided within national forest landscapes.

This section deals only with successional forest conditions. Permanent openings such as open woodlands, savannas, grasslands, barrens and glades, balds, wildlife openings, old fields, pastures, and rights-of-way are covered elsewhere in this document. Mid- and late-successional conditions are covered only generally in this section; more detailed treatment of desired conditions for these successional stages can be found under individual forest community sections.

For analysis purposes, forest succession is divided into four stages: early, sapling/pole, mid, and late as shown in Table 3- 64. (SAMAB 1996e: 11, 284). Early-successional forest is defined as regenerating forest of 0 to 10 years of age for all forest community types. It is characterized by dominance of woody growth of regenerating trees and shrubs, often with a significant grass/forb component, and relatively low density or absent overstory. This condition is distinguished from most permanent opening habitats by dominance of relatively dense woody vegetation, as opposed to dominance of grasses and forbs. Such conditions may be created by even-aged and two-aged regeneration cutting, and by natural disturbance events, such as windstorms, severe wildfire, and some insect or disease outbreaks. Ages defining the remaining successional stages vary slightly by forest community type. Sapling/pole forest is characterized by canopy closure of dense tree regeneration, with tree diameters typically smaller than 10 inches. Mid-successional forest begins to develop stratification of over-, mid-, and understory layers. Late-successional forests, usually greater than 80 years old, include old growth conditions. This stage contains the largest trees and often has well-developed canopy layers and scattered openings caused by tree mortality.

Table 3- 64. Forest Age (Years) Corresponding to Successional Stages for Each Forest Community Type[1].

Forest Community Type	Successional Stage			
	Early	Sapling/Pole	Mid	Late
Mixed Mesophytic Forest	0-10	11-40	41-80	81+
River Floodplain Hardwood Forest	0-10	11-20	21-60	61+
Dry-Mesic Oak Forest	0-10	11-40	41-80	81+
Dry and Xeric Oak Forest; Woodland and Savanna	0-10	11-40	41-80	81+
Xeric Pine & Pine-oak Forest & Woodland	0-10	11-40	41-80	81+
Dry and Dry-mesic Oak-pine Forest	0-10	11-40	41-80	81+
Eastern Riverfront Forest	0-10	11-20	21-60	61+
Seasonally Wet Oak-hardwood Woodland	0-10	11-20	21-60	61+

1. Forest Community Types defined by CISC forest type groupings in Table 3- 30 and Table 3- 31.

Of particular importance as habitat are forest conditions that exist at both extremes of the forest successional continuum: early-successional and late-successional forests. Appendix E, Tables L1 and L2 identifies species of viability concern associated with early-successional forests, mixed successional forest landscapes, and late-successional forests of a variety of forest community types.

Early-successional forests are important because they are highly productive in terms of forage, diversity of food sources, insect production, nesting and escape cover, and soft mast. Early-successional forests have the shortest lifespan (10 years) of any of the forest successional stages, and are typically in short supply and declining on national forests in the Southern Appalachians (SAMAB 1996e:28), and in the eastern United States (Thompson and DeGraaf 2001). Early-successional forests are also not distributed regularly or randomly across the landscape (Lorimer 2001). These habitats are essential for some birds (ruffed grouse, chestnut-sided warbler, golden-winged warbler, prairie warbler, yellow-breasted chat, blue-winged warbler, Swainson’s warbler); key to deer, turkey, and bear in the South; and sought by hunters, berry pickers, crafters, and herb gatherers for the wealth of opportunities they provide (Gobster 2001). Many species commonly associated with late-successional forest conditions also use early-successional forests periodically, or depend upon it during some portion of their life cycle (Hunter et al. 2001).

Sapling/pole stages are generally of least value to wildlife, because closed canopies limit understory development, and trees are not yet large and old enough to begin producing mast or other wildlife benefits. However, this successional stage does provide value as cover for some species. Mid-successional forests begin to look and function like late-successional forests, and provide habitat for many species that use late-successional forests. For most of these species however, mid-successional forests provide lower quality habitat than do late-successional forests.

Like early-successional forests, late-successional forests provide habitats and food supplies for a suite of habitat specialists as well as habitat generalists. These habitats are important providers of high canopy nesting, roosting, and foraging habitat, suitable tree diameters for cavity development and excavation, and relatively large volumes of seed and hard mast. Although it takes many decades for late-successional forest conditions to develop, these habitats are more common and contiguous across the Forest and are dominant features in the SAA area (SAMAB 1996e:28).

At the time of the SAA, National Forest lands had only 3 percent of forest habitats in the early-successional stage, while 89 percent was in the mid- and late-successional classes; 45 percent of this was late-successional forest (SAMAB 1996e:168). Other public lands were similar to the National Forest. Conversely, private industrial lands had 22 percent in early-successional forest and only 4 percent in late-successional forest; private non-industrial had 8 percent in early-successional forest and 9 percent in late-successional forest (SAMAB 1996e:168-169). The 20-year trends (SAMAB 1996e:28) show early-successional forest on National Forests decreasing by 4 percent, with late-successional forest increasing by 34 percent. Trends for private forests are mixed, with increases in both early- and late-successional forest percentages. These results likely reflect the mixed objectives of private landowners, with some focusing on commodity production and others on amenity values. In general, on National Forest lands forest conditions are weighted heavily toward total acres of older forests, while private forests are providing a more balanced distribution of forest successional conditions from young to old (Trani-Griep 1999).

Quality of forest successional habitats may also vary between private and national forest lands. Objectives on national forests to provide for wildlife habitat needs, recreational activities, scenic integrity objectives, and water quality often result in greater vegetation structure retained in early-successional forests than in similar habitats on private lands. On private lands, more intensive management may simplify structure and composition, reducing habitat quality. Similarly, efforts to restore and maintain desired ecological conditions and processes in mid- and late-successional forests also often enhance habitat quality over that found on private lands. For these reasons, conclusions regarding cumulative habitat availability from both private and national forest lands must be made with caution.

Hurricanes (Foster and Boose 1992), lightning frequency (Delcourt and Delcourt 1998), fire frequency (Whitney 1986), and pre-settlement cultural activities (Delcourt 1987) were probably the major sources of disturbance events that created early successional forests prior to European occupation. Less drastic perturbations such as mortality events from tornadoes, insect or disease outbreaks, or defoliation (passenger pigeon roosts) were typically less extensive and cyclic but nonetheless provided a source of early-successional forest conditions. Natural disturbances, however, are unpredictable, episodic, and heterogeneous (Lorimer 2001); influential at a landscape scale; and are neither uniform nor random in distribution. Anthropogenic disturbances occurred more frequently in floodplains along major rivers and in "hunting grounds."

Overall, landscape patterns more consistently contain a component of early-successional forests in places more "likely" to be susceptible to disturbances, i.e., south and west facing slopes, sandy or well drained soils, or in fire adapted plant communities. Fire suppression, intensive agriculture resulting in massive soil losses, land use changes, and urban sprawl have drastically altered the variables that would perpetuate a landscape with a significant component of early- successional forests. With many species associated with early successional forests in the southeast in decline (Hunter et al. 2001), it is imperative that management actions include some provision for perpetuating early-successional forest conditions. At the same time, many of these same factors, especially land use conversion, have reduced the distribution and abundance of quality late-successional forests across the larger landscape. Maintenance of these on public lands is equally imperative.

The current successional stage distributions for the Chattahoochee and Oconee National Forests are shown in Table 3- 65 and Table 3- 66, respectively. The majority of the Chattahoochee National Forest is in mid- and late-successional stages, with over 50 percent in late-successional stage. Only 2 percent currently is in early successional conditions. The Oconee National Forest has a somewhat younger successional stage distribution. Approximately 6 percent of the Oconee is in early successional conditions while less than 20 percent is in late successional stages. For the Chattahoochee and Oconee National Forests combined, 2.6, 15.1, 33.5, 48.8 percent of the forests currently are in early successional, sapling/pole, mid-successional, and late-successional conditions, respectively.

Table 3- 65. Percentages of Forested Acreage on the Chattahoochee NF in Each Successional Stage by Forest Community Type[1], 2000.

	Successional Stage			
Forest Community Type	Early	Sapling/ Pole	Mid	Late[2]
Conifer-Northern Hardwood Forest	3.5	30	46.1	20.4
River Floodplain Hardwood Forest	3.2	12.9	24.4	59.5
Dry Mesic Oak Forest	0.8	7.2	18.2	73.8
Xeric Pine & Pine-Oak Forest & Woodland	4.1	12.7	18.6	64.6
Dry and Dry-mesic Oak-Pine Forest	3.9	19.5	35.7	40.9
Eastern Riverfront Forest	0	6.7	0	93.3
Percent of Total Acreage	2.1	13.2	31.4	53.2

1. Forest Community Types defined by CISC forest type groupings in Table 3- 30 and Table 3- 31.
2 Old Growth Acres Are Included As Late-Successional Forest.
3 Source: Plan Revision CISC data, modified from C-O CISC data, Base year 2000.

Table 3- 66. Percentages Of Forested Acreage On The Oconee NF In Each Successional Stage By Forest Community Type[1], 2000.

Forest Community Type	Successional Stage Early	Sapling/ Pole	Mid	Late[2]
River Floodplain Hardwood Forest	0.3	0.5	9.7	88.4
Dry Mesic Oak Forest	1.8	3.2	75.3	19.8
Dry and Dry-mesic Oak-Pine Forest	7.5	38.5	47.0	7.0
Eastern Riverfront Forest	0.0	0.2	12.7	87.1
Seasonally Wet Oak-Hardwood Woodland	0.0	0.0	0.0	100.0
Percent of Total Acreage	5.7	28.1	47.1	19.1

1. *Forest Community Types defined by CISC forest type groupings in Table 3- 30 and Table 3- 31.*
2. *Old Growth Acres Are Included As Late-Successional Forest.*
3. *Source: Plan Revision CISC data, modified from C-O CISC data, Base year 2000.*

Since 1985, the quantity of early successional habitat on the Chattahoochee and Oconee National Forests has declined by over 60 percent (Figure 3 - 10). During the same time, the amount of late successional habitat has nearly doubled.

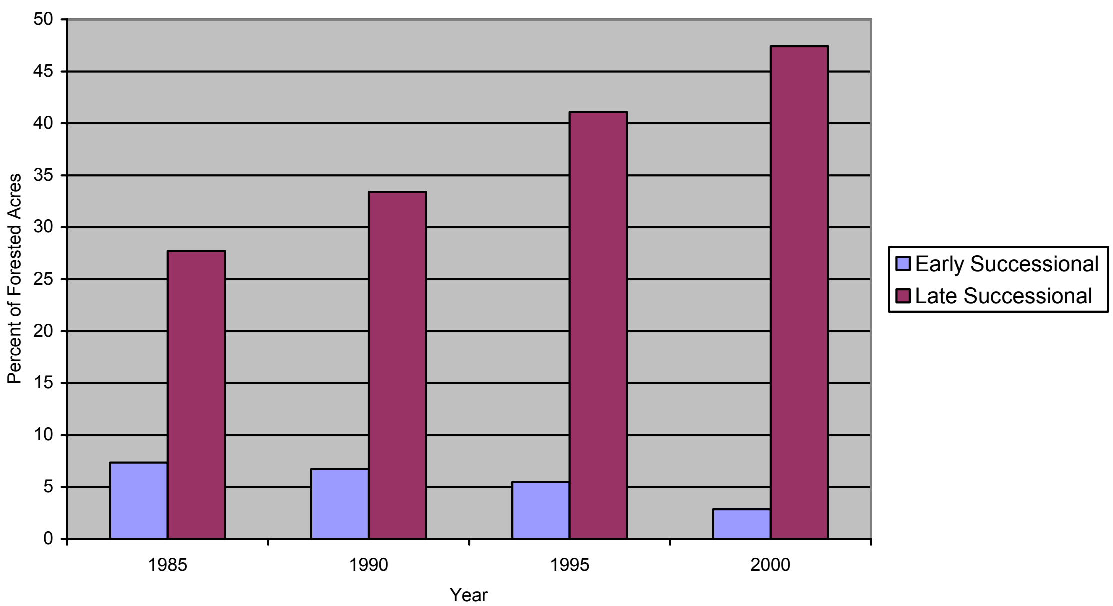


Figure 3 - 10. Trends in Early and Late Successional Habitat, Chattahoochee and Oconee National Forests, 1985-2000.

Indicators of conditions related to successional-forest habitats are acreage or percent of forested acres on the national forest within three categories of forest successional stages: 1) early successional forest, 2) mid- and late-successional forest combined, and 3) late-successional forest alone. These three indicators are selected because they are most relevant to describing important habitat conditions. Early-successional forests are a key condition required by many species, and their level indicates near-future presence of sapling/pole successional stages as well. Because most species associated with late-successional conditions will also be found to some extent in mid-successional forests, the combined level of these successional stages provides an indication of the total base of habitat available for these species. However, because late-successional forest conditions will often provide better quality habitat for these species, a focus on levels of this stage alone is also meaningful.

The prairie warbler (*Dendroica discolor*) is selected as management indicator species to represent early-successional forests. Because the mid- and late-successional forest habitats support more divergent communities depending on their composition, management indicator species for these habitats are identified and analyzed under the individual major forest community sections of this document.

Prairie warblers are shrubland nesting birds found in suitable habitats throughout the Southern Appalachians, Piedmont and Coastal Plain (Hamel 1992). Prairie warblers require dense forest regeneration or open shrubby conditions in a forested setting. Near optimal habitat conditions are characterized by regeneration, thinned area or patchy openings 10 acres or more in size where woody plants average 2 to 3 meters in height, 3 to 4 cm dbh, and occur in stem densities around 3000 stems/acre (NatureServe 2001). Populations respond favorably to conditions created 3 to 10 years following forest regeneration in larger forest patches (Lancia et al. 2000). Providing a sustained flow of regenerating forests is necessary to support populations of prairie warbler. Populations of prairie warbler have been steadily declining in the Eastern United States (Trend -2.08, P value less than 0.0001; Sauer 2001). Prairie warbler commonly occurs in early successional habitats on both the Chattahoochee and Oconee National Forests.

Direct and Indirect Effects

To guide provision of forest successional habitats in the plan and to facilitate effects analysis, four different mixes of successional forest conditions were defined and assigned to prescriptions, which were then allocated to national forest lands. These four options describe objectives for percentages of early-successional forest to be provided by natural causes or management actions, percentages of mid- and late-successional forests combined (including old growth), and percentages of late-successional forest (including old growth). Objectives were set for these measures, because these were deemed the most meaningful measures of habitat availability for dependent species. The options were designed to cover the full spectrum of successional mixes needed to cover the range of preferences documented for forest-associated species. In other words, if each of these options is allocated to some portion of the landscape, all forest-associated species should find some portion of the landscape with optimal successional forest mixes.

Option 1 is assigned to those areas for which there are no specific objectives for creating early-successional forests through management actions. These areas would be expected to provide primarily mid-and late-successional forest habitats in the short term, with late-successional forest conditions eventually predominating.

Option 2 areas also have no specific objectives for early-successional forests, but creation of such habitat through management action may provide up to 4 percent of forested acres in early-successional forest conditions, where compatible with the emphasis of the prescription. These areas have an objective of a minimum of 75 percent of forested acres in mid- and late-successional forest and a minimum of 50 percent in late-successional forest. Therefore, these areas also are expected to become dominated by late-successional forests over time.

Option 3 areas are characterized by objectives to create an intermediate mix of forest successional stages, with 4 to 10 percent of forested land in early-successional forest condition. Objectives for older forests in these areas are to maintain a minimum of 50 percent of forested acres in mid- to late-successional forest and a minimum of 20 percent in late-successional forest.

Option 4 areas are characterized by a mix of forest successional stages, with an emphasis on early-successional forests. Objectives are to maintain 10 to 17 percent of forested acreage in early-successional forest, 20 percent in mid-and late-successional forests, and 10 percent in late-successional forest. Expected percentages of successional forest conditions by option are summarized in Table 3-67.

Table 3- 67. Desired Percentage of Forested Acreage by Successional Mix Options Allocated to Chattahoochee-Oconee NF Lands

Successional Mix Option	Early-Successional	Mid- and Late-Successional	Late-Successional
1	0	100	100
2	0-4	>75	>50
3	4-10	>50	>20
4	10-17	>20	>10

Allocation of these prescription options to national forest lands varies across alternatives. Forestwide mixes of successional habitats by alternative may be compared by noting the acreage allocated to each of these four successional stage options (Table 3- 68 and Table 3- 69). These allocation percentages may be combined with desired successional mix percentages (Table 3- 67) to estimate total forestwide successional forest mixes (Table 3- 68 and Table 3- 69). These estimates represent unconstrained attainment of forest successional stage objectives, and provide an additional means to compare alternatives.

For both the Chattahoochee and Oconee National Forests, Alternative F would provide the greatest quantity of early-successional habitat and the least amount of late-successional habitat. Conversely Alternative G would provide the greatest quantity of late-successional habitat and the least early-successional habitat. On the Chattahoochee, all alternatives except alternative F would maintain at least 50 percent of the Forest in mid and late-successional stages. All alternatives except G and E would maintain an average of 3 percent or more (midpoint of early successional range) of the forested acreage in early successional conditions. On the Oconee, all alternatives would maintain an average of 5 percent or more in early successional conditions, and all alternatives except Alternative F would maintain approximately half or more of the forest in mid- and late-successional conditions.

Table 3- 68. Percent Of Total Forest Acres Allocated To Successional Stage Options by Alternative, And Projected Percentages Of Total Forested Acreage To Be Maintained In Various Succession Stages If Option Objectives Are Met, Chattahoochee National Forest[1].

Alternative	Percentage of Forested Acreage Allocated to Forest Successional Mix Option				Projected Percentage of Forested Acreage by Successional Stage		
	1	2	3	4	Early	Mid and Late	Late
A	22	40	35	2	1.6 - 5.5	> 70.7	> 49.8
B	23	23	51	3	2.3 - 6.5	>66.6	>45.3
D	25	20	30	26	3.8 - 8.2	>59.5	>43.0
E	33	57	5	5	0.7- 3.6	>79.4	>63.1
F	20	11	1	68	6.9 - 12.1	>42.1	>32.3
G	51	43	6	0	0.3 - 2.3	>86.1	>73.5
I	22	42	35	1	1.5 - 5.4	>71.2	>50.1

[1]*Source: IMI analysis of using GIS stands data as modified for plan revision, Alt A-G 12/02/02; Alt IM 8/26/03, Base year 2000.*

Table 3- 69. Percent Of Total Forest Acres Allocated To Successional Stage Options by Alternative, And Projected Percentages Of Total Forested Acreage To Be Maintained In Various Succession Stages If Option Objectives Are Met, Oconee National Forest[1].

Alternative	Percentage of Forested Acreage Allocated to Forest Successional Mix Option				Projected Percentage of Forested Acreage by Successional Stage		
	1	2	3	4	Early	Mid and Late	Late
A	3	6	75	16	4.6 - 10.4	> 48.3	> 22.5
B	2	8	90	0	3.6 - 9.3	>53.0	>24.0
D	7	1	75	17	4.7- 10.4	>49.0	>24.6
E	3	15	72	10	3.9 - 9.5	>52.5	>26.2
F	3	1	22	74	8.3 - 14.8	>29.4	>15.2
G	10	20	70	0	2.8 - 7.8	>60.1	>34.1
I	8	5	87	0	3.5 - 8.9	>55.3	>27.9

[1]*Source: IMI analysis of using GIS stands data as modified for plan revision, Alt A-G 12/03/02; Alt IM 8/23/03, Base year 2000.*

Approximately 40 percent of the Chattahoochee and Oconee National Forests are in State-designated Wildlife Management Areas (WMAs). These areas are managed cooperatively by Georgia DNR and USFS personnel for both game and non-game wildlife species. Table 3- 70 and Table 3- 71 display the projected quantities of early successional habitats by alternative for the WMAs on the Chattahoochee and Oconee National Forests, respectively. Overall, the quantity of early successional habitat for the WMAs as a whole is similar to the rest of the Forests. However, for some individual WMAs on the Chattahoochee National Forest, the projected quantity of early successional habitats would be very limited (Table 3- 70). Across all alternatives, the Chattahoochee, Chestatee, and Rich Mountain WMAs would have substantially less early successional habitat than the on the other WMAs and the rest of the Forest. Early successional habitat also would be very limited on Swallows Creek WMA in Alternative E and Lake Burton and Warwoman WMAs in Alternative G. This suggests that although the availability of early successional habitats would be adequate for the Chattahoochee National Forest as a whole for most alternatives, in some cases it would be poorly distributed. This is especially true for Alternatives E and G where early successional habitats would be very limited for a number of the WMAs. On the Oconee National Forest, the quantity of early successional habitat for the WMAs is similar to the rest of the Forest (Table 3- 71).

Table 3- 70. Projected Percentages Of Total Forested Acreage To Be Maintained In Early-Successional Stage If Option Objectives Are Met For Wildlife Management Areas (WMA), Chattahoochee National Forest[1].

WMA	Projected Range in Percentage of Forest Acres in Early Successional Stage						
	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Blue Ridge	1.3-6.0	2.1-7.1	3.8-9.0	0-3.8	5.2-10.8	0-3.2	1.3-5.9
Chattahoochee	0.6-2.2	1.1-2.9	0.8-2.4	0-0.1	3.0-5.5	0-1.3	0.2-1.6
Chestatee	0.8-3.1	1.9-4.8	1.9-3.5	0-0.7	3.2-6.0	0-1.5	0.6-2.9
Cohutta	1.9-4.9	2.0-5.3	3.4-6.9	2.4-5.0	5.1-8.8	0.1-2.1	1.6-4.8
Coopers Creek	1.6-6.4	3.9-9.6	3.1-8.4	0-3.7	7.9-14.3	0-2.0	2.8-8.2
Johns Mountain	2.2-6.1	2.7-7.0	6.0-11.3	0-1.4	10.0-17.3	0-2.6	2.5-7.0
Lake Burton	1.3-5.1	1.9-5.6	4.7-9.3	1.9-5.3	5.7-10.6	0-0.6	1.6-5.6
Lake Russell	3.5-8.9	0-3.8	4.0-10.0	0-3.7	9.9-16.9	3.5-8.6	3.1-8.5
Rich Mountain	0.2-1.8	1.4-3.5	2.1-4.0	0-1.4	2.0-4.2	0-0	0-1.6
Swallows Creek	1.3-5.1	1.4-5.5	4.2-8.4	0-0.5	6.0-10.6	0-1.8	0.4-3.9
Warwoman	0-4.0	2.9-8.4	2.1-6.0	1.3-4.8	3.6-15.6	0-0	2.3-7.3
WMA Totals	1.5-5.0	2.0-5.8	3.3-7.2	0.9-3.3	5.8-10.4	0.2-2.2	1.5-5.1
Chatt. NF Totals	1.6-5.5	2.3-6.5	3.8-8.1	0.7-3.6	6.9-12.1	0.3-2.3	1.5-5.4

[1]*Source: Plan Revision GIS stands data layer, Alt A-G as of 11/25/02; Alt I as of 8/26/03, Base year 2000.*

Table 3- 71. Projected Percentages Of Total Forested Acreage To Be Maintained In Early Successional Stage If Option Objectives Are Met For Wildlife Management Areas (WMA) , Oconee National Forest[1].

WMA	Projected Range in Percentage of Forest Acres in Early Successional Stage						
	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Cedar Creek	3.5-9.0	3.5-9.0	3.5-8.7	3.5-9.0	8.7-15.0	3.5-9.0	3.4-8.7
Redlands	7.0-13.4	3.5-9.2	7.2-13.5	4.5-9.7	8.6-15.3	0.6-3.9	3.8-9.6
WMA Totals	5.4-11.3	3.5-9.1	5.5-11.2	4.0-9.4	8.6-15.2	2.0-6.1	3.6-9.2
Oconee NF Totals	4.4-10.1	3.5-9.0	4.5-10.0	3.7-9.2	8.4-15.1	2.7-7.5	3.5-8.9

[1]*Source: Plan Revision GIS stands data layer, Alt A-G as of 11/25/02; Alt I as of 8/26/03, Base year 2000.*

SPECTRUM modeling provides a means for examining attainment of desired successional mixes at particular points in time within the constraints of other factors such as existing age-class distribution. Modeled mixes of successional stages at 10 and 50 years of plan implementation vary by alternative due to the differences in management intensity and emphasis (Table 3- 72, Table 3- 73, and Table 3- 74). Only suitable acres were modeled with SPECTRUM. While the majority of the vegetation manipulation will occur on suitable acres, some level of manipulation is expected on a portion of the unsuitable acres. Therefore the projected acres of early and late successional habitats likely are slightly underestimated and overestimated, respectively.

The SPECTRUM projections show a similar pattern among alternatives to those illustrated by the successional class options, above. For the Chattahoochee National Forest, Alternatives G and E would provide the least amount of early-successional habitat while Alternatives F and D would provide the most (Table 3- 72). Alternatives G and E would provide the greatest amount of late-successional habitat while Alternatives F and D would provide the least (Table 3- 74). As compared to current conditions, the quantity of late-successional habitat would decrease at year 10, but increase by year 50 for all Alternatives. In year 10, all alternatives would increase the quantity of early-successional habitat over what is currently available. All alternatives except Alternative G and E would increase the quantity of early-successional habitats at year 50.

For the Oconee National Forest, for all alternatives, the quantity of late-successional habitat would slightly decrease at year 10 as compared to current conditions (Table 3- 74). However, at year 50, the availability of late-successional habitats would increase substantially under all alternatives. In year 10, all alternatives would maintain or increase the quantity of early-successional habitat over what is currently available (Table 3- 72). All alternatives, except Alternatives B and I, would increase the quantity of early-successional habitats at year 50.

Table 3- 72. Expected Percent Of Forested Acreage In Early-Successional Forest Conditions On The Chattahoochee And Oconee National Forests, After 10 And 50 Years Of Implementing Forest Plan Alternatives[1].

	Chattahoochee		Oconee	
Alternative	Year 10	Year 50	Year 10	Year 50
Alternative A	4.3	2.2	7.0	7.5
Alternative B	5.7	3.0	5.7	4.6
Alternative D	7.0	4.4	14.1	7.2
Alternative E	4.3	0.6	5.8	7.0
Alternative F	7.8	5.5	18.5	18.1
Alternative G	3.2	0.4	5.7	6.5
Alternative I	4.4	2.7	5.7	4.7

[1]*Source : SPECTRUM model outputs, September 2003*

Table 3- 73. Expected Percent Of Forested Acreage In Mid- And Late–Successional Forest Conditions On The Chattahoochee And Oconee National Forests, After 10 And 50 Years Of Implementing Forest Plan Alternatives[1].

	Chattahoochee		Oconee	
Alternative	Year 10	Year 50	Year 10	Year 50
Alternative A	82.6	86.4	62.8	69.1
Alternative B	80.7	82.5	64.1	72.4
Alternative D	79.5	**78.8**	55.2	74.1
Alternative E	83.7	95.2	64.0	72.5
Alternative F	77.8	71.5	52.2	56.2
Alternative G	84.5	95.4	64.2	78.4
Alternative I	82.3	86.4	64.3	70.9

[1]*Source : SPECTRUM model outputs, September 2003*

Table 3- 74. Expected Percent Of Forested Acreage In Late-Successional Forest On The Chattahoochee And Oconee National Forests, After 10 And 50 Years Of Implementing Forest Plan Alternatives[1].

	Chattahoochee		Oconee	
Alternative	Year 10	Year 50	Year 10	Year 50
Alternative A	49.0	72.3	16.4	34.5
Alternative B	47.2	67.6	16.7	37.5
Alternative D	46.8	63.6	16.3	37.8
Alternative E	49.8	79.9	16.7	38.0
Alternative F	44.9	57.5	16.9	36.3
Alternative G	50.9	80.2	16.7	43.5
Alternative I	48.8	72.0	16.4	36.7

[1]*Source : SPECTRUM model outputs, September 2003*

Range-wide densities for prairie warbler average less than 1 breeding pair/ha with a range of 0.7 pairs/ha in western Massachusetts and up to 2.5/ha in southeastern Massachusetts (NatureServe 2001). Mean breeding densities calculated from several studies and reported by Hamel (1992) is 0.4 breeding pairs/ha. Mean territory size was 1.6 ha in Indiana, and 0.5 ha in Maryland (NatureServe 2001). In a multi-year study in South Carolina, breeding densities were recorded from 0.3 to 0.6 pairs/ha in a longleaf pine plantation (Droge et al. 1993, Wagner et al. 1994, Irby et al. 1995, 1996).

Because of the tight association of breeding prairie warblers with early-successional forests, prairie warbler populations are expected to vary by alternative in direct relation to the abundance of this successional stage. For the Chattahoochee National Forest, at year 10, prairie warbler populations are expected to increase under all alternatives with the greatest increases in Alternatives F and D (Table 3- 75). At year 50, populations would be expected to decrease slightly in Alternatives E and G due to the limited availability of early successional habitats. Population levels are expected to increase in all other alternatives except Alternative A where little change is expected. Population trend estimates are based on expected trends in habitat quantity and quality.

Table 3- 75. Expected Population Trend[1] Of The Prairie Warbler On The Chattahoochee NF By Alternative 10 And 50 Years Following Plan Adoption.

Time Period	Alternative						
	A	B	D	E	F	G	I
10 years	+	+	++	+	++	+	+
50 years	=	+	+	–	+	–	+

[1] *Population trend expressed as expected change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "- -" = relatively large decrease.*

For the Oconee National Forest, at year 10, prairie warbler populations are expected to be maintained at current levels under Alternatives B, E, G, and I, and increase under Alternatives A, D, and F (Table 3- 76). At year 50, populations would be expected to decrease slightly in Alternatives B and I due to the limited availability of early successional habitats. Population levels are expected to increase in all other alternatives. Population trend estimates are based on expected trends in habitat quantity and quality.

Table 3- 76. Expected Population Trend[1] Of The Prairie Warbler On The Oconee NF By Alternative 10 And 50 Years Following Plan Adoption.

Time Period	Alternative						
	A	B	D	E	F	G	I
10 years	+	=	++	=	++	=	=
50 years	+	–	+	+	++	+	–

[1] *Population trend expressed as expected change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "- -" = relatively large decrease.*

Cumulative Effects

Across the landscape in which the National Forests exist, cumulative mixes of successional forests will be affected by actions on private lands, and results of insect and disease outbreaks and storms that serve to create relatively large patches of canopy tree mortality. Although outbreaks and storms are difficult to predict, levels of these influences and private land factors are not expected to vary across alternatives. These external factors would be considered in site-specific planning under all alternatives to moderate cumulative effects. Early-successional forests created by outbreaks or storms would be included in calculations of existing conditions, which would be used to determine whether management actions are needed to meet early-successional forest objectives. If objectives were met through these unplanned events, creation of additional early-successional forest by management action would not be planned.

Presence of quality successional forest habitats on surrounding private lands, to the extent they can be known, would be considered during site-specific planning to determine where within the range of successional forest objectives is most desirable for national forest lands. However, in order to provide for the diversity of plant and animal communities on national forest land as required by the National Forest Management Act, an effort would be made under all alternatives to achieve successional mixes on national forest lands that are within the objectives or desired conditions of each allocated prescription and its associated successional mix option. Although exact mixes would vary somewhat across alternatives as described in the preceding section, when viewed cumulatively across the landscape, it is expected that the national forest lands would provide the majority of late-successional forests, and private land would provide a greater proportion of early-successional forests under all alternatives.

High-Elevation, Early-Successional Habitats

Affected Environment

While early-successional habitats are important for many species throughout the Southern Appalachian region, a relatively small but important subset require these habitats at high elevations, generally above 3,000 to 3,500 feet elevation (SAMAB1996:76; Hunter et al. 1999:52-60). The limited and declining abundance of these habitats has put associated species at risk. For the purposes of this analysis, high-elevation early-successional habitats are defined to include early-successional forests, restored woodlands and grasslands, old fields, balds, open bogs and glades, and maintained openings such as utility rights-of-way.

The Southern Appalachian Assessment used remote-sensing data to estimate the presence of approximately 27,000 acres of high-elevation early-successional habitat within the Southern Appalachian region, of which approximately one-quarter occurs on national forest land (SAMAB 1996:79). These habitats have been declining as a result of fire suppression, succession of old fields, and reduced management intensity on national forests (Hunter 1999:54). Although abundance of these habitats likely peaked in the late 1800's along with farming at high elevations, evidence suggests some level of these habitats was present prior to European settlement due to the effects of burning by Native Americans, and grazing of bison and elk (Hunter 1999:53). Current trends in populations of associated species such as golden-winged warblers (*Vermivora chrysoptera*) and Appalachian Bewick's wren (*Thyromanes bewickii altus*) suggest that these habitats are below desired levels of abundance needed to maintain the full complement of native species on national forest land. Appendix E identifies additional species of viability concern associated with early-successional habitats found at high elevations (over 3,000 ft).

Analysis of current vegetation cover on the Chattahoochee National Forest indicates there are 111,345 acres of high-elevation habitats above 3,000 feet elevation. This acreage represents 12 percent of total acres on the Chattahoochee-Oconee National Forest. Less than 5 percent of the high-elevation acres are in the 0-10 age class (early successional).

Direct and Indirect Effects

Because of the importance of high-elevation early-successional habitats in supporting native species, the revised Forest Plan includes an objective to annually create and/or maintain between 146 and 433 acres above 3,000 feet in an early-successional condition depending on the alternative. Alternatives vary in the amount of this condition likely to be maintained (Table 3- 77) due to differing allocations of prescriptions to high elevation areas.

Table 3- 77. Average Annual Acreage Of NF Land Above 3,000 Feet Created and/or Maintained In Early-Successional Habitats By Alternative For The Chattahoochee NF[1]

	Chattahoochee National Forest						
	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Acres maintained in high-elevation early-successional habitat	324	427	433	193	146	327	324

Source: Output derived from GIS Plan Revision CISC database
[1] There are no elevations above 3,000 feet elevation on the Oconee National Forest

To more broadly assess opportunity for creation and maintenance of high-elevation, early-successional habitats across alternatives, allocations of prescriptions to high elevation areas were summarized by four forest successional stage options. These options define desired mixed of forest successional stages. (See the section on *Successional Forests* for a full description of successional stage options.) The prescriptions were also rated for compatibility with vegetation management. Both successional stage option and vegetation management intensity rating indicate levels of opportunity for creating and maintaining high-elevation early-successional habitat (see Table 3- 78 and Table 3- 79, below).

Table 3- 78. Acres Of NF Land Over 3,000 Feet In Elevation Allocated To Each Successional Stage Option By Alternative On The Chattahoochee-Oconee NF

	Forest Successional Stage Option			
Alternative	1	2	3	4
A	51,228	44,585	9,651	3,067
B	54,051	25,459	26,092	3,754
D	58,428	27,563	10,587	12,755
E	64,966	41,741	2,649	0
F	51,875	22,695	79	34,565
G	72,785	36,570	0	0
I	51,228	44,585	9,651	3,067

Source: IMI Effects Analysis Output August 2003

Table 3- 79. Prescriptions Acres Rated For Likely Level Of Vegetation Management by Alternative On Chattahoochee-Oconee NF Lands Over 3,000 Feet

	Vegetation Management Level			
Alternative	None	Low	Moderate	High
A	0	0	1,820	1,490
B	0	1,018	2,609	638
D	0	1,103	1,059	2,172
E	0	0	1,670	265
F	0	908	8	5,876
G	0	1,463	0	0
I	0	1,783	965	521

Source: IMI Effects Analysis Output August 2003

Management Indicator Species

The chestnut-sided warbler is selected as the most appropriate MIS for high-elevation early-successional habitats because of its strong association with these habitats, and because its populations should be responsive to forest management efforts to create and sustain such habitats. Also, the chestnut-sided warbler is effectively monitored using established protocols. This species is selected to help indicate the effects of management activities on the suitability of high elevation early seral habitats for associated wildlife. Other habitat-based measures would be used in combination with MIS population data.

The chestnut-sided warbler is a disturbance-dependent specialist found in early-successional habitats, and its populations are in decline (Trend –0.69, P value 0.05258, Sauer 2001). Chestnut-sided warblers are closely associated with stand replacement burns, extensive blowdowns, riparian early-successional habitat created by flooding or beaver activity (Richardson 1995, Askins 2000), and may reach their highest densities in clearcuts (Freedman 1981). At high elevations, deciduous shrubs or laurel brush along streams or field borders, deciduous second growth, alder thickets, and large forest clearings (Richardson 1995) provide suitable nesting and foraging habitat for this species. In portions of the Appalachians chestnut-sided were found in thickets of young chestnut trees which die prior to reaching maturity (Richardson 1995). Near optimal habitat conditions are characterized by regeneration or shrub dominated deciduous conditions typically containing rubus spp. (Richardson 1995), with woody plants between 1 and 10 meters in height. Populations of chestnut-sided warblers have actually been observed to decline with a decrease in rubus. spp. (Pfeifer Nature Center 2002). In the absence of large-scale natural disturbances, management practices (prescribed burning, timber harvesting) that effectively provide early-successional habitat will best manage for this species throughout its range (Schulte 1998).

Below is a table showing expected population trend for chestnut-sided warbler by alternative. This is based on restoration and maintenance objectives for high elevational early successional habitat established for the Chattahoochee National Forest.

Table 3- 80. Expected Population Trend for Chestnut-sided Warbler on the Chattahoochee-Oconee National Forest by Alternative

Alternative/Units of Comparison	A	B	D	E	F	G	I
				Percent of Forested Acres			
MIS – Community Indicators				Trends*			
Chestnut-sided Warbler (High Elevation Early-successional Habitats)							
1st decade	+	+	+	+	–	+	+
5th decade	+	+	+	+	–	+	+

*Population trends expressed as expected change from current levels:

++	=	relatively large increase
+	=	increase
=	=	little to no change
–	=	decrease
– –	=	relatively large decrease

Cumulative Effects

Trends in land use and management (i.e., lack of fire, succession of existing early successional habitat) that have resulted in loss of high quality early-successional habitats at high elevations are likely to continue on private lands. Forest health threats, while causing overstory mortality in some high-elevation forest communities that may contribute to high-elevation early-successional conditions, are not expected to create the habitat structure needed by all associated species. In light of these cumulative effects, efforts to maintain quality high-elevation early-successional habitats on national forest lands will be critical to sustaining associated species.

Old Growth

Introduction

In the fall of 1996 the provision of old growth, along with its amount and distribution, was identified as a public issue common to each of the five forests in revision. At the same time, efforts led by the Forest Service were underway to provide regionally consistent guidance for addressing old growth in plan revisions.

Summary of Old Growth Guidance

In 1989, Forest Service Chief Dale Robertson issued a national position statement on old growth. Beginning in 1990, the Southern and Eastern Regions of the Forest Service national forest system; the Forest Service Southern, Northeastern, and North Central research stations of the Research arm of the Forest Service; and The Nature Conservancy began efforts to develop science-based old growth definitions for the Eastern United States. The effort proved to be problematic partly because so few representatives of old growth conditions exist, and their history is so poorly known that quantifying the range of natural variability was imprecise. But after five years of effort, in December, 1995 the Southern Regional Forester chartered the Region 8 Old Growth Team to make the draft scientific old growth definitions 'operational and useful.' In June of 1997 the Team completed a report entitled *Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region*; hereafter called the 'old growth report' (Forest Service, 1997).

The old growth report recognized a group of seven characteristics that taken all together, or in some combination, distinguish old growth from younger communities. These characteristics are: (1) large trees for the species and site; (2) wide variation in tree size and spacing; (3) accumulations of large-sized dead standing and fallen trees in amounts that are high in comparison to earlier growth stages within the same community; (4) decadence in the form of broken or deformed tops or boles and root decay; (5) multiple canopy layers; (6) canopy gaps and understory patchiness. These characteristics are inter-related. For example, the death of trees creates the canopy gaps, variation in spacing, and the accumulation of dead and fallen trees. Gaps, in turn, raise the light intensity underneath the largest trees and support greater photosynthesis for the development of multiple canopy layers.

The old growth report gave operational definitions for sixteen old growth community types that, among them, encompassed nearly all of the forest cover types in the Southeast. Exceptions were that a few forest types were considered as rare communities, and the tropical forests of the Caribbean were not included. The operational definitions established four defining criteria that had to be met before a stand would be considered 'existing' old growth. In order to be conservative, these criteria, by design, did not include all seven of the old growth characteristics. These defining criteria are:

(1) a minimum age in the oldest age class,
(2) no obvious human-caused disturbance that conflicts with old growth characteristics,

(3) minimum basal areas (a measure of stem density) of stems 5" dbh. and larger, and
(4) the diameter at breast height (dbh) of the largest trees.

Except for number two, the values for these criteria varied by old growth community type. For number two, no quantitative measures were given.

The scale established for meeting old growth guidance was the ecological section unit. *(Refer to the 'Description of Ecological Units' section of this EIS for the details of ecological sections.)* On the Chattahoochee and Oconee, there are three ecological sections. The Armuchee Ranger District in northwest Georgia is in the Southern Ridge and Valley ecological section. The mountain portion of the Chattahoochee is in the Blue Ridge Mountains ecological section. Approximately 46,000 acres on the Chattooga Ranger District south of Turnerville, Georgia and all of the Oconee NF are in the Southern Appalachian Piedmont ecological section.

Within each ecological section, the old growth report also generally charged each Forest to provide:

(1) distribution of old growth blocks in a network;
(2) three sizes of old growth patches;
   (a) large, larger than 2,500 acres;
   (b) medium, 100 through 2,500 acres; and
   (c) small, 10 through 99 acres; and
(3) representation of each old growth forest community type ecologically appropriate.

The guidance did not stipulate how to develop a network. In developing the guidance, old growth patches were assumed to be occurring on the Forest in a matrix of mid- to late-successional forest conditions, providing wildlife habitat connectivity without old growth allocations being physically contiguous or being linked physically by corridors. Mid-successional conditions occur in upland old growth types by age forty and by age twenty in the riparian hardwoods. On the Chattahoochee approximately 85 percent of forest cover is forty or older. On the Oconee approximately 66 percent of forest cover is forty or older. (*See the 'Forest Cover' topic of this EIS for details.)* In addition, a fragmentation analysis done as part of wildlife habitat analysis showed that most of the National Forest lands of both the Chattahoochee and Oconee occur within a matrix of more than 70 percent forest cover when private lands are also considered. (*See the 'Forest Interior Bird' topic of this EIS.)* At a much larger scale, the timber supply and demand analysis reports done as part of the analysis of the management situation found that the Chattahoochee is in a landscape approximately 70 percent forested and the Oconee is in a landscape approximately 65 percent forested. *(See the 'Forest Products' topic of this EIS for more detailed data.)*

An exception to the large block requirement was made for forests in the Coastal Plains, Northern and Southern Cumberland Plateau, the Southern Appalachian Piedmont, and the Mississippi Alluvial Valley ecological sections because of land ownership patterns. National Forests in these ecological units were required to provide medium and small-sized potential old growth blocks. On the Chattahoochee and Oconee National Forests, this exception applies to an area consisting of the entire Oconee plus an additional area of about forty-six thousand acres on the south end of the Chattooga Ranger District. It does not apply to the Armuchee Ranger District in the Southern Ridge and Valley ecological section.

The old growth allocations addressed in the old growth report were not to be large and medium patches of a single old growth type. The diversity of ecological conditions and the biology of tree species dictates that medium and large patches will contain several old growth types, often occurring as small patch sizes but aggregating to a contiguous block of old growth management.

Representation was limited to ensuring that each ecologically appropriate old growth community type was present, not a total amount nor an amount per each community. Representation was not intended to require the allocation of an old growth patch on every possible variation of soil, slope, elevation, aspect, or other physical factor. The distribution guidance did not specify an amount, such as acres or percent of area. Amounts; that is, acres, were to be a forest plan decision based on public issues and ecological capabilities of the land.

Representation did not address the restoration of formerly occurring forest cover that would add old growth community types. On the Chattahoochee for example, 'northern hardwood' forest cover types such as sugar maple, beech, and yellow birch have not been mapped, but the component species occur as scattered individuals within stands having another predominant composition. Should communities of this vegetation be restored or mapped as new stands by refining the discrimination of earlier mapping, it would add old growth type 1, northern hardwoods. Restoration objectives of the plan do include restoring longleaf pine and longleaf pine—oak communities in the Southern Ridge and Valley, thus adding another old growth community type.

The Biological Significance of Old Growth

To date, no species has been identified in the Southeastern United States that is considered an old growth obligate; that is, requiring old growth for some portion or all of its life cycle. Therefore, the provision of existing or future old growth in the forest plan revisions is not directly linked in a cause and effect relationship to the viability of any species. Viability is considered separately and includes identification of needed habitats. The findings of the viability assessments have been considered in allocating land to old growth and old growth compatible management.

However, old growth is a condition that is particularly rich in habitat attributes for a variety of wildlife and these attributes occur in close association (intra-stand) with one another as opposed to a landscape scale (inter-stand) distribution. A wider variety of habitat niches are available than in earlier life stages of the same community. The long development period with low to moderate disturbance that does not replace the stand is conducive to the formation of multiple canopy layers that may include 'emergent' trees, dominant and co-dominant trees, suppressed trees, and a forest floor shrub layer. Canopy gaps of various sizes caused by: (a) the death in-place of a single tree, or (b) the deaths in-place of small groups of trees, or (c) the falling of a group of trees, provide micro-sites with higher light regimes, higher stem counts, and an 'edge effect' both around the edge of the gap and back into the surrounding stand. Standing dead trees provide large and small diameter snags for foraging, perching, and cavity excavation. Down logs and limbs provide a substrate for wood decomposing fungi and insects; cover for small mammals, amphibians, and insects; and in later stages a 'nurse log' for the establishment of new tree seedlings. Large-diameter living trees, having had long-term exposure to natural damaging agents, have the potential through wood-rotting fungi activity for the formation of large cavities suitable for bear, raccoon, squirrel, bats, or other cavity users. The heavy limb structure that develops in some tree species as they age provides sturdy nest platforms for species such as bald or golden eagles.

<u>The Social Significance of Old Growth</u>
Whether biologically necessary to species or not, old growth is of value to people. There seems to be a general sense that it is intelligent to have the habitat on the landscape whether or not obligate species occur. In Aldo Leopold's words, '*The first rule of intelligent tinkering is to keep all the parts.'* Old growth obligates do occur in other parts of the world; so a conservative approach would be to provide it here just in case. As with Wilderness, there also appears to be a desire for places almost completely unmodified by humans whether or not those holding such a value ever visit them; that is, an 'existence' value. The value of old growth is also related to the idea that good stewardship is to restore ecological conditions. In simplest terms, we; that is, society in general, ought to 'fix back like it was what we have broken.' There also appears to be a rather poorly expressed desire to have what is valued occurring at a scale on the landscape each person holding that value can readily relate to. That is, it is not enough to say something valued is being provided 'somewhere.' It must be at a scale people identify with. An example might be their State of residence or commonly known physiographic areas within a state such as 'the Georgia Mountains.'

In more pragmatic terms, old growth has other recognized social values. It is a desirable recreation setting, both for its biological variety and for the associated state of mind from knowing one is in an 'old growth' setting. It serves as a 'biological time machine' in that it is a reference for what areas with comparable ecological characteristics may have been previously and could be restored to, given a similar amount of time and disturbance history. Put another way, they are an imperfect window into what 'like it was' might mean. They are imperfect because there can be no assurance that they reflect typical or average disturbance conditions throughout their lives. Remnant communities may exist because they are in particularly favorable situations, therefore not 'average' or 'representative'. They are a valuable part of showing a comprehensive whole of ecological dynamics in conservation education. They are a source of scientific information, such as through tree ring analysis.

<u>Implementation of Old Growth Guidance in Forest Plans</u>
Each of the Forests used the old growth report guidance to respond to the old growth issue. On the Chattahoochee-Oconee, forest cover vegetation data was enhanced with an identifier of the appropriate old growth community type for each mapped

vegetation community. Locations of *possible* old growth, that is, stands old enough to meet or exceed the minimum old growth age for each old growth type, were then displayed in a GIS map. These areas were called 'possible' because, although there was good reason to believe they met one of the old growth criteria, they would not necessarily meet the remaining three. Blocks of possible old growth were used as core areas for the allocation of lands to an old growth management prescription or to an old-growth compatible prescription. The term 'old growth compatible prescription' is being coined for convenience in this analysis and is non-technically defined here as any prescription with a management direction that does not provide for living trees to be cut on anything but an incidental basis. These correspond to the management prescriptions that have no wildlife habitat objective for early-successional habitat conditions. An example is Wilderness. A complete discussion of the strategy used to implement the old growth guidance is in Appendix D of the Plan.

Affected Environment

The Southern Appalachian Assessment (SAA) pre-dates the development of the Regional old growth report. It is therefore not directly comparable in every respect but still provides valuable context. The SAA combined the late-successional and potential old growth vegetation stages and found that they represented slightly more than 18 percent of the assessment area considering all ownerships (SAMAB 1996, Report 5:24). Within this 18 percent, rounded percents were; National Forest 42 percent, private non-industrial forest 36 percent, other public 20 percent, and private industrial 1 percent (SAMAB 1996, Report 5:26). Across the assessment area, the three most commonly represented forest cover type groups were, in order, oak-hickory, oak-pine, and southern yellow pine. This order was true whether all ownerships were considered or just National Forest. The late-successional and old growth combined group was 45 percent of National Forest and an estimated 54 percent of other public (SAMAB 1996, Report 5:168). On National Forest there had been a trend of increase in the late-successional and old growth stage acreage during the period from the mid-1970's to 1995 in each forest type group (SAMAB 1996, Report 5:173). In addition, within the assessment area unsuitable acreage (not planned for timber harvest) exceeded suitable (planned for timber harvest) acreage on National Forest for each old growth type group except; (a) river floodplain hardwood forest, and (b) eastern riverfront forest. Total National Forest acreage was 1,098,491 with 61 percent of that being unsuitable (SAMAB 1996, Report 5:178). This does not include other public lands, for example, the Great Smoky Mountains National Park, that are significant portions of the Southern Appalachian landscape.

Occurrence of Old Growth Types on the Chattahoochee-Oconee National Forests

The analysis of old growth begins with matching forest cover type mapping of the Region 8 vegetation inventory (CISC Continuous Inventory of Stand Condition) to its appropriate old growth community type. *(Refer to the 'Forest Cover' topic of this EIS for a more complete review of forest cover codes and names.)* The old growth report provided a crosswalk for making this match, except that some forest types were matched with two old growth types. In that situation, the driest areas were split from moist areas by using 'site index' which is how tall on average trees will grow in fifty years. In the table, site index is shown as "SI." This match is shown in Table 3- 81, below. The results were to derive nine old growth types as appropriate to the Chattahoochee and Oconee combined.

Table 3- 81. Forest Cover Types Included in Each Old Growth Community Type on the Chattahoochee and Oconee National Forests

OGTY #	OGTY Name	Included CISC Forest Cover Type Codes
02	conifer/northern hardwood	03
05	mixed mesophytic & western mesophytic	04, 05, 08, 09, 41, 50, 56
13	river floodplain hardwood	46, 58, 61, 62, 63, 64, 65, 71,
21	dry-mesic oak forest	51, 52 w/ SI > 60, 53, 54, 55, 59 w/ SI > 60, 60 w/ SI > 60
22	dry-xeric oak forest, woodland, savanna	52 w/ SI < 60, 59 w/ SI < 60, 60 w/ SI < 60
24	xeric pine & pine-oak forest, woodland	12 w/ SI < 60, 15, 16 w/ SI < 60, 20, 32 w/ SI < 60, 33 w/ SI < 60, 38, 39
25	dry & dry-mesic oak-pine	10, 12 w/ SI > 60, 13, 16 w/ SI > 60, 31, 32 w/ SI > 60, 33 w/ SI > 60, 42, 44, 45, 47, 48
27	Seasonally wet oak-hardwood woodland	62, 64
28	eastern riverfront forest	72, 73, 82

Source: Forest Service, 1997.*Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region, modified for local conditions and to split forest types assigned to more than one old growth type.*

In Table 3- 82 below, the applicable old growth types and the total acreage of each one by each ecological section for the Chattahoochee-Oconee National Forest is shown. Total acres are shown for each old growth type in order to understand the relative abundance of each type at the ecological section scale, regardless of age. The pattern of relative abundance in turn highlights relationships to rare communities, probability of conflicts with other objectives, and also has implications for feasible old growth patch sizes. Relative abundance does not track exactly with the SAA due to; (a) refined scale down to more homogenous ecological section, and (b) refinement of forest types within each old growth type since the SAA was published. However, the general pattern found by the SAA continues to hold.

Table 3- 82. Total Forested Acres by Old Growth Community Type and Ecological Section for the Chattahoochee-Oconee National Forest

Old Growth Type	Old Growth Type Name	Ecological Section Blue Ridge Mountains (acres)	Southern Ridge and Valley (acres)	Southern Appalachian Piedmont* (acres)
2	conifer/northern hardwood	69,669	0	109
5	mixed mesophytic & western mesophytic	130,145	1,382	5,826
13	river floodplain hardwood	951	277	10,491
21	dry-mesic oak forest	223,746	10,706	26,288
22	dry-xeric oak forest, woodland, savanna	35,663	6,933	384
24	xeric pine & pine-oak forest, woodland, savanna	34,030	4,045	3,672
25	dry & dry-mesic oak-pine	142,691	41,384	107,164
27	seasonally wet oak-hardwood woodland	0	0	3,304
28	eastern riverfront forest	112	0	88
TOTAL		637,007	64,726	157,326

Source: Plan revision CISC data, modified from C-O NF CISC data. Base year 2000.
* Note: Southern Appalachian Piedmont data includes 46,206 acres on the Chattooga Ranger District

Current (2000) Quantity of Existing Old Growth on the Chattahoochee-Oconee

Existing old growth was defined by the old growth report as '*forest stands that meet all four criteria* (age, disturbance, basal area, and tree size) *described in the operational definitions*.' Of course this meant within its applicable old growth community type.

Historic vegetation inventory did not collect data sufficient to determine whether or not all four of the basic old growth criteria were satisfied. For example, in the past forest cover was aged for the representative age of an entire community of from ten to about fifty acres. The old growth guidance requires aging the *oldest* trees in a community. Since issuance of the old growth report, the Forest Service has done some field inventory focused on individual stands rather than blocks. Georgia Forest Watch (GFW) has done field reconnaissance for old growth. The GFW data has been shared with the Forest Service and was used between draft and final to guide the allocation of approximately 3,500 more acres into an old growth prescription. In addition, an old growth inventory done as part of the Chattooga River Ecosystem Management Demonstration Project was also used to guide management prescription allocations. Refer to Appendix D of the Plan for more details.

Current (2000) Quantity of Possible Old Growth on the Chattahoochee-Oconee

The old growth report defined 'possible old growth' as *"forest stands identified during the preliminary inventory of old growth because they meet one or more of the preliminary inventory criteria."* Table 3- 83 below details the acreage of CISC stands that was at or beyond the old growth age based on the year 2000; that is, 'possible' old growth.

The acres shown in the table are based on CISC stand ages. Stand ages are collected for the age class of trees that represent the pre-dominant age of the stand. It is not uncommon for stands to contain two age classes, especially on the Chattahoochee;

the predominant one of seventy to one hundred years old and an older one of about one hundred to one hundred and forty years old. Because of this, the estimated acres of possible old growth should be considered conservative rather than liberal.

Table 3- 83. Acres of Possible Old Growth by Old Growth Type and Ecological Section on the Chattahoochee-Oconee National Forest

Old Growth Type	Old Growth Type Name	Min. Age	Ecological Section		
			Blue Ridge (acres)	Ridge and Valley (acres)	Southern Appalachian Piedmont (acres)
2	conifer/northern hardwood	140	7	n/a	n/a
5	mixed mesophytic & western mesophytic	140	6,436	7	-
13	river floodplain hardwood	100	196	56	-
21	dry-mesic oak forest	130	10,342	-	10
22	dry-xeric oak forest, woodland, savanna	110	10,873	94	-
24	xeric pine & pine-oak forest, woodland	100	11,358	69	-
25	dry & dry-mesic oak-pine	120	6,183	-	-
27	Seasonally wet oak-hardwood woodland	100	n/a	n/a	0
28	eastern riverfront forest	100	52	-	-
TOTAL			45,447	226	10

Source: Plan revision Continuous Inventory of Stand Conditions (CISC) database; base year for age is 2000

Environmental Consequences

The measures of response to this issue in the effects analysis for each alternative are; (1) the protection afforded to existing old growth, (2) the protection afforded to potential old growth, (3) the amount (acreage) allocated to old growth and old growth compatible prescriptions for each old growth community type within each ecological section unit, and (4) the trend of acres over time with tree cover meeting minimum old growth age. In analyzing the trend of recruitment into potential old growth, each of, (a) those prescriptions modeled for a timber yield, and (b) other prescriptions are considered first separately and then combined.

Direct and Indirect Effects

Allocations of the alternatives were designed to meet the old growth guidance and provide a network of representative medium and/or large blocks of old growth conservation. These blocks were formed in large part by combining stands that met their minimum old growth age into an area of old growth allocation. Stands aged at more than twenty years younger than the minimum old growth age were generally avoided in allocating for future old growth.

Beyond the allocation of large and medium blocks in the alternatives, the draft plan standards essentially said: (1) conserve all existing old growth, and (2) if any stand meets minimum old growth age in the oldest age class, inventory against all old growth criteria, and – if it meets existing - conserve it. These standards were originally written without the benefit of analysis and in response to specific public comment. The analysis for the draft revealed that there is a strong trend of more and more stands aging into possible old growth in old growth types 22 and 24 in the Blue Ridge Mountains ecological section within the next twenty years. This trend occurs even when management prescriptions with objectives that would preclude old growth development on some portion of their acreage are included. In old growth type 24, the xeric pine and pine-oak forest, woodland, and savannah, in the Blue Ridge ecological section, 43 percent of its total acreage would be at or beyond minimum old growth age by 2020 with more than 21 percent of this being within management prescriptions with specific activity objectives. In old growth type 22, the xeric oak forest, woodland, and savannah, in the Blue Ridge ecological section, 22 percent of its total acreage would be at or beyond minimum old growth age by 2020 with more than 9 percent of this being within management prescriptions with specific activity objectives. And these particular types within these management prescriptions are the focus of several wildlife habitat objectives. They are also at increasing risk with age to southern pine beetle, oak decline, and gypsy moth attacks.

Therefore, for the final, the standard requiring the conservation of all existing old growth was somewhat relaxed for old growth types 22 and 24 in the Blue Ridge. Now they are noted as an exception to that requirement. But that exception is tempered by a requirement to give priority consideration to management that continues to meet old growth criteria if the purpose(s) of projects implementing plan objectives on those lands can continue to be met.

In addition, for the final, the standards for small block allocation were re-focused, amplified, and strengthened in several ways.

- Additional small block allocation of approximately 5 percent of National Forest is required during project-level work. These allocations are scaled to occur within each 6th level hydrologic unit with 1,000 acres or more of National Forest that do not already have at least 5 percent in old growth or old growth compatible allocations. Total acreage of 6th level hydrologic units ranges from approximately 10,000 acres to approximately forty thousand acres. There are 176 of these with National Forest ownership. This scale is large enough to provide opportunity to identify riparian old growth types that are in short supply on National Forest and would be considered in a less coordinated way at smaller scale. Scaling to 6th level hydrologic unit also maintains a flexible distribution pattern that is network dependent since streams are a network system.

- The quality of a stand or group of stands in meeting the four defining old growth criteria is given first priority in allocating small blocks. This focuses additional allocations into ensuring the occurrence of old growth characteristics as rapidly as possible by conserving the best representatives.

- After quality, a secondary level of priority by ecological section for additional allocation is given first to those old growth types least represented, second to the old growth type with next-best representation, and so. This focuses additional allocations into improving old growth community representation into the future.

- Direction is given for priority small block allocation within the Piedmont portion of the Chattooga Ranger District. By being at less ecological section scale, this direction goes beyond what is required by the old growth guidance.

<u>Old Growth and Old Growth-Compatible Allocations of Chattahoochee-Oconee Alternatives</u>

Each alternative evaluated in detail includes management prescriptions that relate to old growth in one of two ways. First, they may have the primary intent of protecting possible old growth and expanding it. Second, they may provide old growth indirectly as the result of management focused on other values, such as primitive recreation or scientific study. But, as noted in the old growth report, the primary focus of old growth management in the short term of ten to fifteen years and the medium term of fifteen to thirty years is restoring it on the landscape. And the primary component of restoration is simply time; time for existing stands to age through the gradual development of old growth conditions. For that reason, alternatives are compared by the sum of the acreage they allocate to *both* old growth and old growth compatible prescriptions.

There were five old growth prescriptions considered across all alternatives. They are identified with the number “6” then alpha characters, starting at “A.” The first three, A through C, have no planned, periodic vegetation management program. The last two, D and E, do allow for up to 4 percent of openings with woody vegetation less than or equal to ten years of age.

Old growth compatible management prescriptions are those that have no planned, periodic vegetation management program that would affect stems larger than five inches in diameter at four-and-one-half feet above the ground. (These are the stems that are considered in meeting old growth criteria.) Cutting of living vegetation is incidental to either low intensity or small-scale projects such as trail maintenance, hazard tree removal, or wildlife or fish habitat work. However, these management prescriptions may allow for prescribed burning which would primarily affect stems less than five inches in diameter at four-and-one-half feet above the ground. Where management prescription direction allows fire use, achieving plan objectives and satisfying plan constraints may also effectively require its use. Existing old growth, potential old growth, old growth restoration prescriptions, and old-growth compatible prescriptions may each have fire use. Fire use is not incompatible with old growth because within conditions that must apply before the Forest Service can prescribe burn, only small, localized flare-ups resulting in large stem mortality have a moderate to high probability of occurring. Such mortality is compatible with the old-growth characteristics because it provides canopy gaps, standing snags, and down woody material; each of which are a characteristic of old growth structure. Further, the need for environmental conditions created by prescribed fire and prescribed natural fire to restore and maintain native plant communities will result in fire being used in old growth areas, especially the yellow pine and oak community types, as a maintenance tool to help perpetuate existing dominant tree species.

Analyzing just those prescriptions that do not plan for routine, periodic vegetation management is a very conservative approach to old growth provision. There are numerous other prescriptions with very low levels of vegetation manipulation. Examples include, the Coosa Bald National Scenic Area, the Ed Jenkins National Recreation Area, the Appalachian Trail Corridor, Geological and Paleontological Areas, Botanical and Zoological Areas, Cultural/Heritage Areas, Regional Forester-designated Scenic Areas, the various roadless area prescriptions (series 12), and the Outstandingly Remarkable Streams. In addition, at least some of the vegetation manipulation used in these prescriptions is likely to be maintenance of a desired vegetation condition on the same acres through time rather than shifting it around, which would affect more land area. Beyond this, all of the management prescriptions that provide for early-successional habitat creation at any rate less than or equal to 7 percent per decade (the approximate mid-point of the 'option 3' objective of from 4 to 10 percent in early successional habitat) also ensure the opportunity for some stands within each of the old growth community types to meet or exceed the minimum old growth age. To put the same idea a different way; harvest at the rate of 7 percent per decade or 0.7 percent each year would take 143 years before – in the 143rd year – the last area of 0.7 percent with trees older than 140 were cut. Since 140 years is the oldest minimum old growth age, and because other existing tree cover is also continuing to age, potential old growth conditions are always available on the landscape at change rates less than or equal to 7-percent per decade and, for most old growth types, at higher rates.

In addition, embedded within all prescriptions is riparian management direction that restricts activities near streams that would 'reset the clock' to a young forest. The area affected is a significant future source of additional old growth, especially since riparian area hardwood old growth types have a lower minimum old growth age. Because of the riparian prescription, this is true even within prescriptions with regular timber harvest outside the riparian area. Localized areas of steep slope, rock outcrops, land areas not feasible to access without acquiring right-of-ways, and lands un-economical to harvest will predictably reach and exceed old growth age under even the most intense harvest regimes considered.

Table 3- 84. Old Growth and Old Growth-Compatible Management Prescriptions Across All Alternatives for the Chattahoochee-Oconee National Forest.

Mgmt Rx No.	Management Prescription Name
0	Custodial management
1.A.	Congressionally-designated Wilderness Area (Chattahoochee only)
1.B.	Recommended to Congress for Wilderness Study (Chattahoochee only)
2.A.1	Congressionally-designated Wild Segment of Wild & Scenic River System (Chattahoochee only)
2.A.2	Congressionally-designated Scenic Segment of Wild & Scenic River System (Chattahoochee only)
2.B.1	Recommended to Congress for Designation as a Wild Segment of the Wild & Scenic River System (Chattahoochee only)
2.B.2	Recommended to Congress for Designation as a Scenic Segment of the Wild & Scenic River System (Chattahoochee-Oconee)
4.B.1	Existing Chief-designated Research Natural Areas (Oconee only)
4.D	Botanical/Zoological Area (Chattahoochee-Oconee)
4.E.1	Cultural and Heritage Areas (Chattahoochee-Oconee)
6.A.	Old Growth with Natural Process Emphasis (Chattahoochee-Oconee)
6.B.	Areas Managed to Restore/Maintain Old Growth Characteristics (Chattahoochee-Oconee)
6.C	Old Growth Areas Managed With a Mix of Natural Processes & Restoration (Chattahoochee-Oconee)
6.D	Core Areas of Old Growth Surrounded by Areas with Extended Even-Aged Management (Chattahoochee-Oconee)
6.E	Core Areas of Old Growth Surrounded by Areas under Uneven-aged Management (Chattahoochee-Oconee)
9.F	Rare Community (Chattahoochee-Oconee)

The tables below show the acreage allocated to each of the old growth or old growth-compatible prescriptions by alternative for the Chattahoochee-Oconee National Forests. Percentages are calculated based on a rounded total land area of 750,000 acres for the Chattahoochee and 115,000 acres for the Oconee. Non-forest lands were not deducted from the divisor because they are insignificant to a rounded percentage.

Table 3- 85. Chattahoochee National Forest Acreage in Old Growth and Old Growth Compatible Management Prescriptions by Alternative

Mgmt Rx No.	Alt. A	Alt. B	Alt. D	Alt. E	Alt. F	Alt. G	Alt. I
0	1,625	1,123	833	833	0	77	1,929
1.A.	118,048	118,066	118,048	117,967	118,249	117,967	117,430
1.B.	7,559	17,981	16,123	32,512	n/a	55,856	8,094
2.A.1	5,998	5,998	5,998	5,998	5,998	5,998	5,998
2.A.2	468	468	468	468	468	468	468
2.B.1	5,660	5,660	5,660	5,660	n/a	5,660	2,120
2.B.2	1,291	1,215	3,625	1,026	n/a	1,695	524
4.D	440	0	0	0	1,326	297	3,363
4.E.1	46	46	46	46	46	46	191
6.A.	13,209	13,585	19,642	13,498	n/a	40,948	0
6.B	947	12,253	316	947	0	23,437	28,059
6.C	0	0	9,970	0	0	66,281	0
6.D	13,322	0	14,712	0	0	3,478	598
6.E	0	0	0	16,425	0	6,453	0
9.F	0	0	0	0	0	0	505
TOTAL	168,613	176,395	195,441	195,380	126,087	328,661	169,279
Percent of Total Forested Acreage	22	24	26	26	17	44	23

Source: Planning GIS stands data layer, extracted and modified from CISC data as of 16 Sep 2003

Table 3- 86. Oconee National Forest Acreage in Old Growth and Old Growth Compatible Management Prescriptions by Alternative

Mgmt Rx No.		Alt. B	Alt. D	Alt. E	Alt. F	Alt. G	Alt. I
0	3	3	3	3	0	3	142
2.B.2	5,277	3,851	10,806	3,851	N/a	7,340	3,581
4.B.1	1,005	1,005	1,005	1,005	1,005	1,005	1,005
4.D	346	25	25	25	232	346	1,215
4.E.1	96	166	96	96	70	185	111
6.A.	0	0	0	2,604	0	6,040	0
6.B	0	0	0	0	0	0	1,617
9.F	0	0	0	0	0	0	593
TOTAL	6,727	5,050	11,935	7,584	1,307	14,919	8,264
Percent of Total Forested Acreage	6	4	10	7	1	13	7

Source: Planning GIS stands data layer, extracted and modified from CISC data as of 16 Sep 2003

Allocation to Old Growth and Old Growth-Compatible Management Prescriptions

Building on Table 3- 85 and Table 3- 86, this section generally presents: (1) the acreage for; (a) each alternative, (b) each old growth type, and (c) each ecological section that is allocated either directly to a prescription with an emphasis of developing old growth conditions, or to one that will result in its development; and (2) the percent of the total acres of that old growth community type. An exception is made in one case, to give greater specificity to that portion of the Chattahoochee National Forest that is within the Southern Appalachian Piedmont; that is the southern end of the Chattooga Ranger District. Within the old growth guidance, this area could be considered along with the Oconee. However, it is shown separately here because it is physically removed from the Oconee and also because ecologically it is transitional between Blue Ridge Mountains and the Piedmont of Georgia.

In interpreting these figures, a few points should be borne in mind. First, the acreage presented here is *not* existing old growth; rather it probably includes a minor amount of existing, a larger amount of possible, but the greatest amount is likely 'future'; meaning that it has not yet reached even the minimum old growth age, much less met the other three criteria, but is being managed so as to reach old growth age and being given opportunity to develop the other characteristics. A second common sense point is that natural tree mortality from insects, disease, weather, or wildfire events will keep some fraction of any allocation from being old growth at any point in time; or, more simply, allocation is no guarantee. The current southern pine beetle epidemic underscores that natural events will stop some areas from developing old growth characteristics and replace other stands after they have developed them. In fact, the old growth condition is itself transitional and should not be assumed to be self-perpetuating. Once stands are exhibiting old growth characteristics they are usually in transition to a different community.

Table 3- 87. Acres For Future Development of Old Growth Characteristics by Old Growth Community Type and Alternative for the Blue Ridge Mountains Ecological Section.

OGTY No.	Total Acres of OG Type	Alt. A	Alt. B	Alt. D	Alt. E	Alt. F	Alt. G	Alt. I
2	69,670	9,884 14%	10,484 15%	13,277 19%	12,221 18%	8,158 12%	27,006 39%	9,715 14%
5	130,145	33,934 26%	37,831 29%	42,605 33%	40,407 31%	29,180 22%	62,627 48%	35,211 27%
13	951	74 8%	74 8%	90 9%	85 9%	0 0	137 14%	74 8%
21	223,746	65,635 29%	70,375 31%	78,926 35%	76,216 34%	57,666 26%	117,544 53%	65,861 29%
22	35,663	7,940 22%	8,363 23%	11,101 31%	8,438 24%	6,888 19%	17,675 50%	9,453 27%
24	34,030	6,335 19%	6,571 19%	8,146 24%	6,603 19%	4,640 14%	23,306 68%	6,037 18%
25	142,691	21,806 15%	24,325 17%	30,158 21%	26,017 18%	18,193 13%	58,701 41%	23,413 16%
28	112	60 54%	60 54%	60 54%	60 54%	0 0	60 54%	60 54%
Sum in 1000s	637 100%	146 23%	158 25%	184 29%	170 27%	125 20%	307 48%	150 23%

Source: Planning GIS stands data layer, extracted and modified from CISC data as of 16 Sep 2003
Note: Percents are of the total acres for each old growth community type, regardless of age or other old growth criteria.

Table 3- 88. Acres for Future Development of Old Growth Characteristics by Old Growth Community Type and Alternative for the Southern Ridge and Valley Ecological Section.

OGTY No.	Total Acres of OG Type	Alt. A	Alt. B	Alt. D	Alt. E	Alt. F	Alt. G	Alt. I
5	1,382	416 30%	321 23%	178 13%	439 32%	0 0	154 11%	281 20%
13	277	0 0	0 0	0 0	26 9%	0 0	48 17%	55 20%
21	10,706	2,358 22%	2,250 21%	895 8%	3,926 37%	0 0	2,462 23%	2,471 23%
22	6,933	4,159 60%	1,813 26%	1,631 23%	2,792 40%	0 0	2,987 43%	2,313 33%
24	4,045	1,507 37%	756 19%	631 16%	1,629 40%	0 0	889 22%	1,063 26%
25	41,384	11,373 27%	7,904 19%	4,819 12%	13,669 33%	0 0	10,169 25%	9,298 22%
Sum (1000s)	65	20 31%	13 20%	8 12%	22 34%	0 0	17 26%	15 23%

Source: Planning GIS stands data layer, extracted and modified from CISC data as of 16 Sep 2003

Table 3- 89. Acres For Future Development of Old Growth Characteristics by Old Growth Community Type and Alternative for the Oconee National Forest Within the Southern Appalachian Piedmont Ecological Section.

OGTY No.	Total Acres of OG Type	Alt. A	Alt. B	Alt. D	Alt. E	Alt. F	Alt. G	Alt. I
5	3,336	192 6%	9 0.2%	248 7%	9 0.2%	9 0.2%	94 3%	188 6%
13	10,086	585 6%	428 4%	1,584 16%	754 7%	61 0.6%	1,445 14%	1,603 16%
21	14,765	1,122 8%	888 6%	1,567 11%	1,101 7%	147 1%	1,588 11%	1,908 13%
25	79,888	3,319 4%	2,445 3%	6,243 8%	4,096 5%	85 0.1%	9,106 11%	2,075 3%
27	3,304	276 8%	224 7%	653 20%	534 16%	0 0	883 27%	751 23%
Sum (1000s)	111	5 5%	4 4%	10 9%	6 6%	0.3 0.3%	13 12%	7 6%

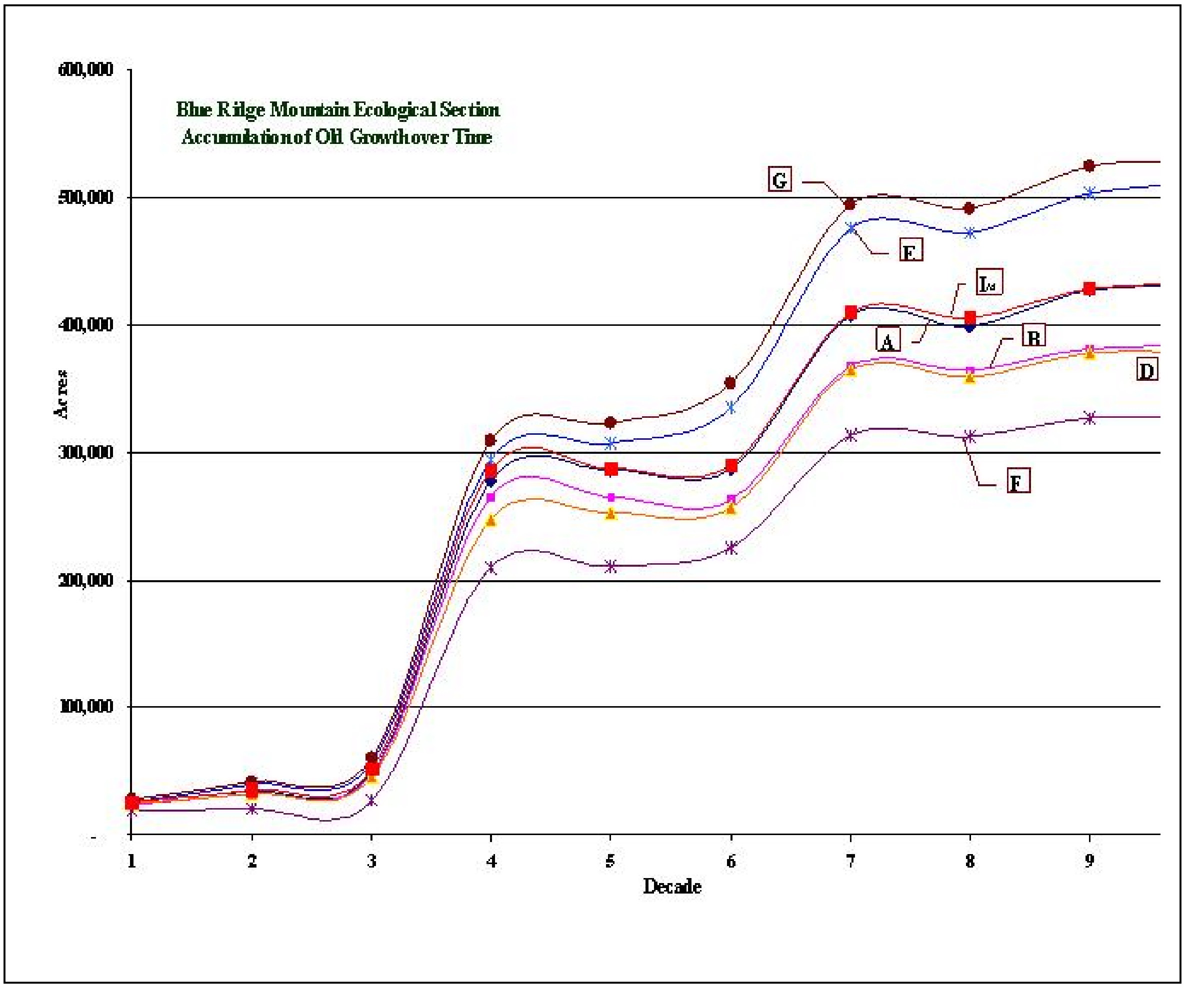
Source: Planning GIS stands data layer, extracted and modified from CISC data as of 16 Sep 2003

Table 3- 90. Acres For Future Development of Old Growth Characteristics by Old Growth Community Type and Alternative for the Portion of the Chattooga Ranger District Within the Southern Appalachian Piedmont Ecological Section.

OGTY No.	Total Acres of OG Type	Alt. A	Alt. B	Alt. D	Alt. E	Alt. F	Alt. G	Alt. I
2	109	43 39%	43 39%	43 39%	43 39%	0 0	43 39%	18 17%
5	2,490	178 7%	379 15%	178 7%	178 7%	24 1%	269 11%	64 3%
13	405	16 4%	16 4%	16 4%	16 4%	0 0	96 24%	100 25%
21	11,523	839 7%	1,833 16%	571 5%	567 5%	607 5%	927 8%	2,005 17%
22	384	9 2%	9 2%	9 2%	9 2%	0 0	9 2%	0 0
24	3,672	245 7%	404 11%	244 7%	244 7%	128 3%	494 13%	520 14%
25	27,276	1,442 5%	2,121 8%	1,252 5%	1,252 5%	290 1%	2,464 9%	817 3%
28	8	8 100%	8 100%	8 100%	8 100%	0 0	8 100%	8 100%
Sum in 1000s	46 100%	3 6%	5 10%	2 5%	2 5%	1 2%	4 9%	4 8%

Source: Planning GIS stands data layer, extracted and modified from CISC data as of 16 Sep 2003

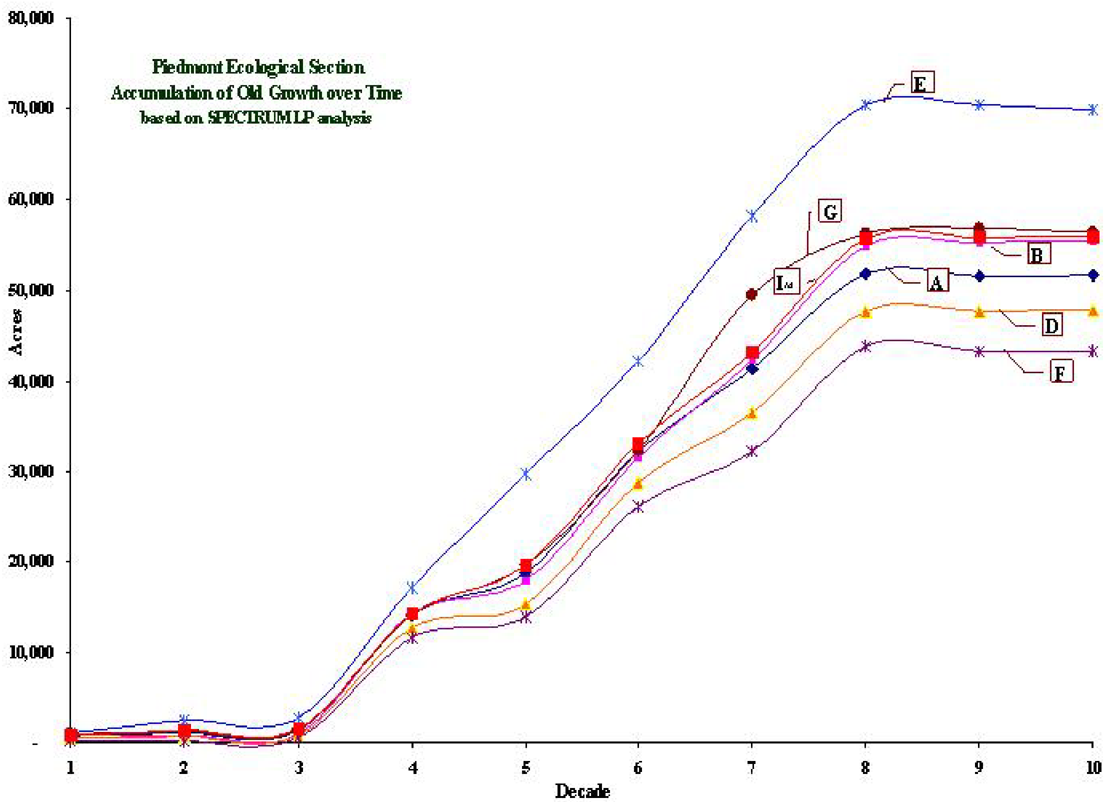
An important additional part of old growth consideration is the rate at which communities reach the minimum old growth age. That is, how fast will there be recruitment into old growth eligibility? The SPECTRUM model was constructed to track this dynamically, using the minimum old growth age appropriate for each old growth type. The variable of time is reflected in the graph below for all acres in each ecological section; that is, including both suitable and unsuitable lands.



Source: SPECTRUM linear programming model September 2003, base year for age 1998.

Figure 3 - 11. Cumulative Recruitment of All Forested Acres to Minimum Old Growth Age By Alternative In the Blue Ridge Mountains Ecological Section.

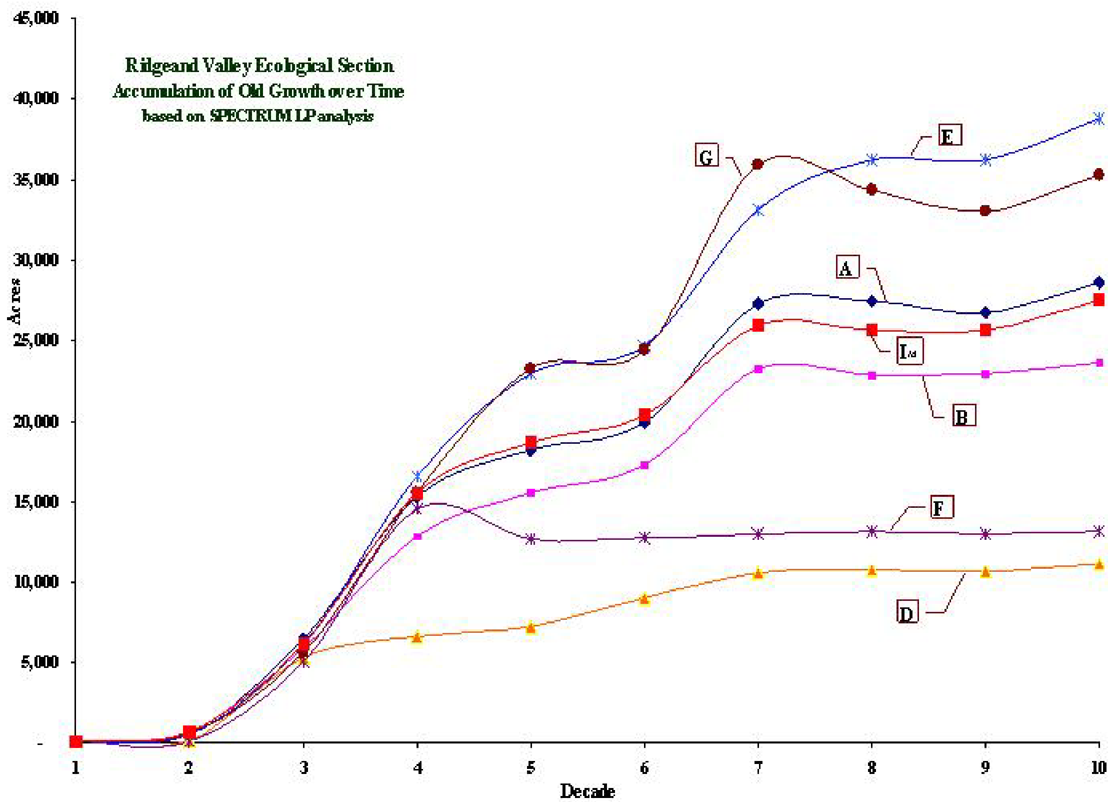
The graph shows that there is existing area with stands meeting minimum old growth age in the Blue Ridge. It also shows all alternatives would maintain some portion of that existing. Until about 2030 the recruitment of stands into minimum old growth age is slow in the context of National Forest ownership. Beyond 2030, the acreage potentially at or beyond old growth age increases rapidly – barring natural catastrophe – until about 2045, slows from 2045 to 2060, accelerates again until 2070, then increases slowly thereafter. Alternative I is intermediate among the alternatives throughout the time period.



Source: SPECTRUM linear programming model September 2003, base year for age is 1998.

Figure 3 - 12. Cumulative Recruitment of All Forested Acres to Minimum Old Growth Age By Alternative In the Southern Appalachian Piedmont Ecological Section.

The graph for the Southern Appalachian Piedmont shows that there is almost no area meeting minimum old growth age in the year 2000. Recruitment is very slow until there begins to be a dramatic increase beyond 2030. The increase, once begun, continues steadily at approximately the same rate until 2080. After that it declines slightly in all alternatives. As in the Blue Ridge, Alternative I remains at or very near the middle of the range among alternatives throughout the time period modeled.



Source: SPECTRUM linear programming model September 2003, base year for age 1998.

Figure 3 - 13. Cumulative Recruitment of All Forested Acres to Minimum Old Growth Age By Alternative In the Southern Ridge and Valley Ecological Section.

The picture for the Southern Ridge and Valley regarding old growth varies from both the Blue Ridge Mountains and the Piedmont. As with the Piedmont and unlike the Mountains, there is almost none initially. However recruitment begins earlier, in 2020 and increases dramatically at a sustained rate between 2020 and 2040. For five of the seven alternatives recruitment continues at a moderate pace from 2040 through 2060, surges again in the decade of 2060 to 2070, then begins to hold more or less steady. As in the other ecological sections, Alternative I stays close to the center of the range among the alternatives.

It should be noted that the underlying assumption of each of the three graphs of possible old growth by ecological section is that existing trees live for the entire 100 years shown. This would not happen in actuality and at some point during this period, tree mortality would exceed recruitment into the age class and cause a decrease in old growth recruitment. After that point, the amount of old growth could be expected to continue to decrease over time. When this decrease would begin and how rapidly mortality would reduce the acreage is uncertain because it is outside the range of available data. Put another way, a sufficient number of old growth samples for a statistically reliable projection estimate cannot presently be obtained because so few vegetation communities exist that are older than about 120 years old.

The graphs also show that even in alternatives with relatively high emphasis on timber management, there will continue to be recruitment into potential old growth; that is, reaching or exceeding the minimum old growth age. Because of the present age class structure of the Forests and because timber and wildlife habitat management activities are so conservative, this trend is significant to the total amount of possible old growth in the future. ‘Suitable’ acres cannot be discounted in their ability to provide the wildlife habitat and recreation opportunities of old growth. They are not mutually exclusive, requiring an ‘either/or’ choice.

In the following four tables, the potential old growth trend is presented in additional detail by numerically showing recruitment by individual old growth types within each ecological section. This degree of detail allows comparison among individual old growth types and between ecological sections for the same old growth type. It also goes beyond the tables showing allocation to an old growth or old growth compatible prescription to show how individual types increase in their area meeting minimum old growth age.

The first table shows both: (a) the total acres of each old growth type by ecological section, and (b) the acres of each old growth type within each alternative. While it would seem at first that these acres should be the same, the major difference arises from the SPECTRUM model. Acres allocated to uneven-aged management do not have a single stand age and therefore are not tracked in the modeling as reaching minimum old growth age. (However, the characteristics of old growth are – or easily could be – characteristic of uneven-aged stands as well.) In subsequent tables, percents are calculated using the total acres of each old growth type, including any acres modeled as uneven-aged. This tends to be a conservative approach. The single-tree selection system within uneven-aged management most nearly mimics the ‘gap dynamics’ of individual or small group tree mortality that shapes old growth conditions and would, by design, meet three of the four defining old growth criteria with time; that is, basal area, diameter, and age provided that the maximum diameter specified in the application of the system were large enough to result in reaching the minimum old growth age or beyond. Group selection is also likely to result in old growth conditions and, because of the silvics of our species and other factors, more likely to be used than single-tree selection. In both group and single tree, making the perpetual maintenance of old growth conditions a system constrain could make the system economically infeasible. Therefore the entire acreage of each old growth community type, including the uneven-aged management acreage, is used as the divisor in calculating percentages.

A minor acreage difference arises from ‘slivers’ that were not included in the model. ‘Slivers’ result when GIS data layers are related to each other and the match is not perfect. For example, if watersheds are related to stands, stands have not been mapped to coincide with watershed boundaries but rather lap in and out. These ‘pieces’ are the ‘slivers’. In the process of constructing the model, several hundred of these; most of which were less than one acre and all of which were less than ten acres, were deleted rather than being carried as individual analysis areas.

Table 3- 91. Acres of Each Old Growth Community Tracked in SPECTRUM, Exclusive of Uneven-aged Management

Ecological Section	Old Growth Type #	Total Community Acres	Alt. A	Alt. B	Alt. D	Alt. E	Alt G	Alt I
Blue Ridge	2	69,669	69,136	69,177	69,124	69,197	69,201	64,168
	5	130,145	117,580	117,791	92,277	119,070	129,930	104,887
	13	951	864	887	828	845	869	707
	21	223,746	222,654	222,729	222,591	222,660	222,660	208,301
	22	35,663	35,433	35,578	35,512	35,485	35,508	33,943
	24	34,030	32,453	32,501	32,459	33,583	33,690	31,565
	25	142,691	132,115	122,979	133,828	141,658	140,458	121,616
	28	112	105	105	105	105	105	84
Southern Ridge and Valley	5	1,382	1,209	1,238	141	1,328	1,328	1,002
	13	277	223	257	223	223	215	205
	21	10,706	10,646	10,658	10,629	10,645	10,647	9,990
	22	6,933	6,905	6,918	6,879	6,904	6,893	6,601
	24	4,045	3,243	3,122	4,024	4,005	3,975	3,163
	25	41,384	39,159	38,612	41,126	40,712	40,712	36,385
Southern Appalachian Piedmont	2	109	68	109	68	81	68	101
	5	5,826	5,184	5,314	1,000	5,242	5,300	4,478
	13	10,491	9,794	9,854	9,778	9,764	9,799	7,909
	21	26,288	25,496	25,572	25,525	25,523	25,530	21,940
	22	384	333	383	351	383	351	365
	24	3,672	2,984	2,922	2,946	3,668	3,658	2,838
	25	107,164	101,502	102,767	123,822	101,167	102,745	99,526
	27	3,304	3,132	3,138	3,131	3,119	3,134	2,564
	28	88	61	66	61	61	61	41

Source: SPECTRUM linear programming model, January 2003 for alt. a thru g and September 2003 for alt.I, base year for age 1998.

In the following three tables, the trend of recruitment; that is, aging into, minimum old growth age is tracked by numerous variables. Those variables are: (a) ecological section, (b) old growth community type, (c) alternative, (d) unsuitable acres, (e) suitable acres, and (f) decade. (*Refer to the 'Forest Products' topic for a full explanation of 'suitability'.)* Once again, the divisor for percents is the total acres of each old growth community type as shown in the third column of Table 3- 91. As a conservative estimate, the percents may be read as 'the approximate proportion of each old growth community type's total acres that have reached at least minimum old growth age in each of the first five decades barring natural catastrophe.'

Table 3- 92. Blue Ridge Mountains Ecological Section: Percent of Total Old Growth Community Type Acres at or Beyond Minimum Old Growth Age by Alternative and Timber Suitability for Each of the First Five Decades.

Old Growth Type		Percent of Total Old Growth Community Type Acres by Land Class & Decade														
		Unsuitable					Suitable					Total				
	Alt.	1	2		4	5	1	2	3		5	1	2	3	4	
2	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	A	2	2	2	19	19	0	0	0	20	20	2	2	2	40	40
	B	2	2	2	15	15	2	2	2	25	25	4	4	4	40	40
	D	3	3	3	20	20	0	0	0	1	1	3	3	3	21	21
	E	0	0	0	34	34	3	3	3	0	0	3	3	3	34	34
	G	3	3	3	35	35	1	1	1	3	3	4	3	3	38	38
	I	2	2	2	21	21	0	0	0	15	15	2	2	2	36	36
13	A	3	3	17	17	17	6	6	49	49	49	9	9	66	66	66
	B	3	3	5	5	5	8	8	62	62	62	11	11	67	67	67
	D	3	3	3	3	3	6	6	61	61	61	9	9	65	65	65
	E	9	9	56	56	56	0	0	11	11	11	9	9	67	67	67
	G	12	12	57	57	57	0	0	11	11	11	12	12	68	68	68
	I	8	8	11	11	11	3	3	52	52	52	12	12	63	63	63
21	A	2	2	2	40	40	1	1	1	30	29	3	3	3	70	69
	B	2	2	2	32	32	1	1	1	39	35	3	3	3	70	66
	D	2	2	2	34	34	1	1	1	37	36	3	3	3	70	70
	E	2	2	2	61	61	0	0	0	10	10	3	3	3	70	70
	G	3	3	3	65	65	0	0	0	5	5	3	3	3	70	70
	I	2	2	2	44	44	1	1	1	26	25	3	3	3	70	69
22	A	9	9	35	35	50	13	13	39	39	47	22	22	74	74	97
	B	7	7	27	27	39	15	15	48	48	58	22	22	74	74	97
	D	9	9	30	30	43	13	13	35	35	45	22	22	65	65	88
	E	20	20	64	64	83	2	2	10	10	14	22	22	74	74	97
	G	22	22	71	71	90	1	1	4	4	8	22	22	75	75	98
	I	13	13	39	39	53	9	9	35	35	44	22	22	74	74	97

Old Growth Type	Alt.	Percent of Total Old Growth Community Type Acres by Land Class & Decade														
		Unsuitable					Suitable					Total				
		1	2		4	5	1	2	3		5	1	2	3	4	
24	A	8	25	26	31	40	11	21	9	3	3	19	46	34	34	42
	B	2	8	12	39	63	7	24	13	14	8	9	32	25	52	71
	D	5	15	16	21	26	12	26	21	1	2	17	41	37	22	28
	E	16	49	50	56	70	1	8	5	2	3	17	57	55	58	73
	G	19	59	60	66	81	0	2	0	1	2	19	61	60	67	83
	I	6	21	21	35	35	13	24	16	14	5	19	45	38	49	41
25	A	1	1	1	17	17	1	1	1	12	10	2	2	2	29	27
	B	1	1	1	10	10	1	1	1	11	11	2	2	2	21	21
	D	1	1	1	9	9	1	1	1	18	17	2	2	2	27	25
	E	2	2	2	32	32	0	0	0	3	3	2	2	2	36	36
	G	2	2	2	34	34	0	0	0	4	4	2	2	2	39	39
	I	1	1	1	14	14	1	1	1	14	13	2	2	2	28	27
28	A	0	0	54	54	54	46	46	46	46	46	46	46	100	100	100
	B	0	0	54	54	54	46	46	46	46	46	46	46	100	100	100
	D	0	0	54	54	54	46	46	46	46	46	46	46	100	100	100
	E	46	46	100	100	100	0	0	0	0	0	46	46	100	100	100
	G	46	46	100	100	100	0	0	0	0	0	46	46	100	100	100
	I	43	43	43	43	43	0	0	50	50	50	43	43	94	94	94

Source: SPECTRUM linear programming model January 2003 for Alt. A thru G and September 2003 for Alt. I. base year for age 1998.

Table 3- 93. Southern Ridge and Valley Ecological Section: Percent of Total Old Growth Community Type Acres at or Beyond Minimum Old Growth Age by Alternative and Timber Suitability for Each of the First Five Decades.

Old Growth	Alt	SRV: Percent of Total Old Growth Community Type Acres by Land Class & Decade														
		Unsuitable					Suitable					Total				
		1	2	3	4	5	1	2	3	4	5	1		3	4	5
5	A	0	0	0	0	26	0	0	0	0	0	0	0	0	0	26
	B	0	0	0	0	20	0	0	0	0	0	0	0	0	0	20
	D	0	0	0	0	74	0	0	0	0	0	0	0	0	0	74
	E	0	0	0	0	25	0	0	0	0	0	0	0	0	0	25
	G	0	0	0	0	6	0	0	0	0	0	0	0	0	0	6
	I	0	0	0	0	12	0	0	0	0	0	0	0	0	0	12
13	A	0	0	0	0	0	0	17	17	17	17	0	17	17	17	17
	B	0	0	0	0	0	6	21	21	21	21	6	21	21	21	21
	D	0	0	0	0	0	0	17	17	17	17	0	17	17	17	17
	E	0	17	17	17	17	0	0	0	0	0	0	17	17	17	17
	G	0	14	14	14	14	0	0	0	0	0	0	14	14	14	14
	I	0	3	3	3	3	5	16	16	16	16	5	19	19	19	19
21	A	0	0	0	0	24	0	0	0	0	3	0	0	0	0	27
	B	0	0	0	0	19	0	0	0	0	3	0	0	0	0	22
	D	0	0	0	0	5	0	0	0	0	5	0	0	0	0	10
	E	0	0	0	0	48	0	0	0	0	2	0	0	0	0	50
	G	0	0	0	0	18	0	0	0	0	50	0	0	0	0	68
	I	0	0	0	0	25	0	0	0	0	1	0	0	0	0	25
22	A	0	0	28	28	28	0	0	44	44	44	0	0	72	72	72
	B	0	0	20	20	20	0	0	52	52	52	0	0	72	72	72
	D	0	0	4	4	4	0	0	68	36	36	0	0	72	40	40
	E	0	0	50	50	50	0	0	15	15	15	0	0	65	65	65
	G	0	0	17	17	17	0	0	53	53	53	0	0	70	70	70
	I	0	0	39	39	39	0	0	33	33	33	0	0	72	72	72
24	A	2	12	26	29	40	0	6	18	6	7	2	18	44	35	48
	B	2	5	12	14	25	0	15	15	2	4	2	19	27	16	29
	D	0	0	0	0	1	1	2	6	0	8	1	2	6	0	9
	E	1	13	40	40	58	0	0	1	1	1	1	13	41	41	59
	G	0	4	9	11	18	1	11	10	10	13	1	15	19	21	31
	I	1	1	13	15	15	0	0	0	0	0	1	11	13	15	15
25	A	0	0	0	14	14	0	0	0	10	8	0	0	0	23	21
	B	0	0	0	12	12	0	0	0	7	7	0	0	0	19	19
	D	0	0	0	3	3	0	0	0	6	4	0	0	0	9	7
	E	0	0	0	23	23	0	0	0	3	3	0	0	0	25	25
	G	0	0	0	8	8	0	0	0	16	16	0	0	0	24	24
	I	0	0	0	18	18	0	0	0	5	4	0	0	0	22	22

Source: SPECTRUM linear programming model January 2003 for Alt. A thru G and September 2003 for Alt. I, base year for age 1998.

Table 3- 94. Southern Appalachian Piedmont Ecological Section: Percent of Total Old Growth Community Type Acres at or Beyond Minimum Old Growth Age by Alternative and Timber Suitability for Each of the First Five Decades.

Old Growth Type	Alt	SAP: Percent of Total Old Growth Community Type Acres by Land Class & Decade														
		Unsuitable					Suitable					Total				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
5	A	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
	B	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
	D	0	0	0	0	23	0	0	0	0	0	0	0	0	0	23
	E	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
	G	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
	I	0	0	0	0	15	2	2	1	1	4	2	2	2	2	18
13	A	0	0	0	20	20	0	0	0	66	66	0	0	0	86	86
	B	0	0	0	23	23	0	0	0	62	62	0	0	0	85	85
	D	0	0	0	21	21	0	0	0	65	65	0	0	0	86	86
	E	0	0	0	37	37	0	0	0	50	50	0	0	0	87	87
	G	0	0	0	31	31	0	0	0	55	55	0	0	0	86	86
	I	0	0	0	26	26	0	0	0	53	53	0	0	0	80	80
21	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	A	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
	B	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
	D	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
	E	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
	G	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
	I	0	0	0	1	5	0	0	0	0	0	0	0	0	1	5
27	A	0	0	0	33	33	0	0	0	54	54	0	0	0	87	87
	B	0	0	0	33	33	0	0	0	54	54	0	0	0	87	87
	D	0	0	0	34	34	0	0	0	53	53	0	0	0	87	87
	E	0	0	0	40	40	0	0	0	47	47	0	0	0	87	87
	G	0	0	0	43	43	0	0	0	44	44	0	0	0	87	87
	I	0	0	0	44	44	0	0	0	39	39	0	0	0	83	83
28	A	0	0	0	0	0	0	0	100	100	100	0	0	100	100	100
	B	0	0	0	0	0	0	0	100	100	100	0	0	100	100	100
	D	0	0	0	0	0	0	0	100	100	100	0	0	100	100	100
	E	0	0	0	0	0	0	0	100	100	100	0	0	100	100	100
	G	0	0	0	0	0	0	0	100	100	100	0	0	100	100	100
	I	0	0	0	0	0	0	0	69	69	69	0	0	69	69	69

Source: SPECTRUM linear programming model January 2003 for Alt. A thru G and September 2003 for Alt. I. base year for age 1998. Note: Piedmont portion of Chattooga RD could not be shown separately because it was not a stratification variable in SPECTRUM.

In the Draft EIS, significant acreages were incorrectly shown for the Blue Ridge Mountains section as meeting the minimum old growth age of 140 years in old growth type 2 – conifer-northern hardwoods. This error was detected and corrected for the Final EIS. It resulted from an incorrect formula in the Excel spreadsheet used to summarize SPECTRUM outputs. The importance of this correction is that it now demonstrates the lack of white pine cover type with a birth year prior to 1863. That date is firmly within white settlement of the mountains following Cherokee removal and is another 'arrow of evidence' of historic woods burning that suppressed the development of white pine cover types. Expressed another way, it is a strong indicator of white pine as a disturbance-related cover type.

Table 3- 92 through Table 3- 94 provide the context for evaluating alternatives. Key features shown include: (1) the total percentage of each old growth type at minimum old growth age by ecological section in the first decade, (2) the proportion of each old growth type in an unsuitable prescription in the first decade and as a trend through time, and (3) the effects of timber harvest in reducing the cumulative amount of each old growth community potentially qualifying as old growth through time. Each of these features will be discussed individually.

The alternative with the largest total percent of possible old growth; that is, decade 1 unsuitable plus suitable, serves to indicate what is possible. It is an indicator only in that even the most conservative alternatives *could* still have had some harvest affecting old growth in the first decade in either suitable or unsuitable prescriptions. However, this possibility is remote in that the earliest regeneration harvest age modeled was at its greatest in those alternatives. Once the most conservative alternative is found; usually either E or G, the other alternatives can be compared to it for the differences in the first decade. The difference is attributable to timber harvest intense enough to regenerate a new young stand.

The second way to evaluate the effects of each alternative is to consider the proportion of each old growth community meeting minimum old growth age in an unsuitable prescription, especially in the first two decades. The more of the total percent meeting minimum old growth age in the unsuitable category, the stronger the general trend in old growth conservation. However, it must be remembered that plan direction requires the conservation of existing old growth even if it is within a suitable prescription so the net effect is the same for the life of this plan revision. This variable also demonstrates how effective plan allocations were at capturing those areas already at minimum old growth age. In other words, were allocations focused and effective ?

The third way to evaluate the alternatives is to look at the pattern of percentage meeting minimum old growth age through time in the suitable category. A pattern of increase followed by a decrease indicates that timber harvest has precluded some stands from reaching minimum old growth age. The alternatives that demonstrate this pattern in some old growth types are A, B, and D. Alternatives E, G, and I either do not show such a pattern at all, or if they do, it is very weak, showing that timber harvest is not precluding old growth recruitment.

The effects of providing old growth allocations within the SAA will be similar to the provision of other types of late successional forest types. There is no obligate wildlife or species of concern associated with old growth. However there are many associated with late successional forest communities. Old growth allocations will certainly contribute to such species well being and may, in time, provide superior habitat for late successional associates through the natural processes that develop habitat niches; such as more cavities, snags, rotting logs and multi-storied canopies.

<u>**Cumulative effects**</u>

Table 3- 92 through Table 3- 94 show that the major old growth types management prescriptions that plan for regular periodic timber harvest will provide significant amounts of potential old growth in the future, barring catastrophe natural loss. This trend illustrates the conservatism of planned harvest regimes and underscores the conclusion of the '*Forest Health'* topic of this EIS that the Chattahoochee in particular is on a trend of increasing risk with advancing age. It also bears out that the prevailing condition of the Forests is a landscape forest cover of late successional conditions.

Each alternative has either large increase in the acreage being managed in such a way as to ensure future old growth or a management intensity that results in providing possible old growth. In addition, other National Forests also in revision will adopt similar management direction. The current 61 percent of Southern Appalachian National Forest system acreage unsuitable for timber harvest will increase through Congressional designation that will not be re-considered in future forest plans. The age class structure of vegetation even within areas being planned for timber harvest is such that large amounts of it will reach and exceed the minimum old growth age, even if the high end of the early-successional habitat objective is consistently reached.

Table 3- 95, below, summarizes an estimate of how much old growth is likely to be provided on other ownerships within and surrounding each of the Chattahoochee and Oconee National Forests. The estimate is a percentage of total acres by ownership likely to provide for old growth development and retention. This information is a 'snapshot' with no dynamic projection of tree aging or future changes in social values considered. This estimate is based upon data reported in each of two timber supply and demand studies; one for each of the Chattahoochee and Oconee National Forests. These studies were written as part of the analysis of the management situation. (*Refer to the 'Wood Products' portion of this EIS for more detail.)*

Each of the timber supply and demand studies included an examination of who owns forestland within a distinct 'market area' related to each Forest. These market areas overlapped and together account for approximately two-thirds of the state of Georgia and significant area in adjacent states. The Chattahoochee market area analysis data is being used here as a useful indicator of potential old growth development for the Blue Ridge Mountains ecological section because the largest portion of it is in that section (Forest Service, 1998a). The Oconee market area analysis data is being used here as a useful indicator of potential old growth development for the Southern Appalachian Piedmont ecological section because it is almost wholly within that section (Forest Service, 1998b). The Southern Ridge and Valley section is within the Chattahoochee market area and could not be separated out in the data.

For National Forest System lands, the old growth percentage of Alternative I is being used because it has received the greatest amount of attention to make it balanced among uses. In addition, the percentage is very close to that of most other alternatives.

For purposes of comparison, other government land ownership; Federal, State, county, or municipal was assumed to have objectives comparable enough to National Forest management that a similar portion of the land area would receive old growth compatible management. This assumption is more likely to underestimate the future old growth potential on those lands rather than overestimate it. This is because the Forest Service has a multiple-use mandate while other government ownerships often focus on a narrower range of objectives requiring less active vegetation management. However, the patch size is expected to be more in the medium and small range, rather than the large blocks. Also, for comparison purposes, an average old growth compatible percentage from Table 3- 85 for the Chattahoochee and Table 3- 86 for the Oconee was calculated, but without including either Alternative F or Alternative G. The reason these were not included is because they are extremes - on the one hand too low in old growth conservation for current thinking and on the other too high to provide for diverse uses and objectives. This average percent was then applied as an estimate of what can reasonably be expected to be occurring on these other government ownerships.

Forest industry lands are treated as if they would provide no old growth. In actuality, from 1 to 2 percent of their land base is likely to not be harvested because of access problems, adverse terrain, low product values, low soil productivity, or wildlife habitat co-ordination. The SAA analysis previously reported in this topic demonstrates this. While recognized as likely, this probability is not being included, once again making the estimate conservative.

The timber supply and demand reports also profiled the timber harvest plans of private forestland owners. That information was summarized from the published results of a questionnaire survey (Birch, 1997). In Georgia, 30 percent of owners controlling 8 percent of the forestland never plan to harvest timber. Almost all of this acreage will occur as tracts of from one to nine acres in size and will often be associated with a primary or secondary residence. This decision is judged very unlikely to be changed. An additional 37 percent of private owners controlling 27 percent of forestland reported that they would possibly harvest at some future date. Of this set, a small subset of them is likely to decide, ultimately, not to harvest, but this possibility is not factored into the quantitative analysis. It is mentioned here as an indicator that the estimate is likely to be low rather than high. (Forest Service, 1998b)

In Table 3- 95, below, an estimated 8 percent of the entire Blue Ridge ecological section landscape, including non-forest, will receive old growth compatible management. Within just forestland, that is not considering non-forest, the amount rises to 11 percent. An estimated 4 percent of the entire Southern Appalachian Piedmont landscape of Georgia will receive old growth compatible management. Within just forestland, this amount rises to 6 percent.

Table 3- 95. Estimated Future Old Growth Acreage Across All Ownerships for Each of the Chattahoochee and Oconee National Forests Wood Products Market Areas.

Market Area	Owner	Total Acres	Estimated Percent Old Growth Compatible	Estimated Future Old Growth Acres
Chattahoochee	Non-forest	3,500,000	0	0
	National Forest	1,500,000	24	360,000
(Representing Blue Ridge	Other Government	248,400	25	62,100
Ecological section)	Forest industry	811,100	0	0
	Other Private	5,379,500	8	430,360
		11,439,000	7	852,460
Oconee	Non-forest	5,700,000	0	0
	National Forest	284,000	6	17,040
(Representing Southern	Other Government	401,000	7	28,070
Appalachian Piedmont	Forest industry	2,160,000	0	0
section)	Other Private	7,924,000	8	633,920
		16,469,000	4	679,030

Source: Cycle 7 (1986) Forest Inventory and Analysis data as reported in Chattahoochee and Oconee timber supply and demand reports March 1998.

The Southern Forest Resource Assessment (Forest Service, 2002) identified that the greatest risk to maintaining forestland is increasing urbanization. Urbanization results in land use conversions out of forest, higher land prices, decreasing tract sizes, and high-density residential development. At the same time, the amenity values of relatively large and tree-covered tracts will increase, making their retention more likely.

On public lands the greatest threat to maintaining old growth will not be management that either removes it or precludes its development. Rather it will be the increasing vulnerability to native insects or diseases; nonnative insects, diseases, and plants; weather-related events; and wildfires. As explained in the 'Forest Cover' topic, natural disturbance events will typically shift species composition away from the original old growth type – especially on dry and xeric sites - thus setting up cumulative long-term declines in the landscape representation. On the Chattahoochee, this shift would usually be toward white pine, a species already demonstrated to have greatly increased in recent history. A low potential exists for increased representation of beech, eastern hemlock, riparian hardwoods, and sugar maple as cover types on the Chattahoochee. Beech and riparian hardwoods could also be increased on the Oconee. But of these, beech is threatened by the beech bark scale and hemlock by the hemlock wooly adelgid. Other species favored by natural succession include hickory and black gum but an increase in their frequency does not create a new old growth community or – in most cases – even increase the acreage of an existing one.